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VOL. XLI

NEW YORK—THURSDAY, DECEMBER 11, 1919—CHICAGO

No. 24

Developments of British Design as Seen at Olympia

In the following notes on British design, Mr. Bourdon brings out many points that might easily escape the reader who has before him a single car description at a time and the development is traced from period to period and from car to car. The sketches add materially by presenting to the reader many of the new devices.

By M. W. Bourdon

ACAREFUL review of automobile design as exemplified by British productions gives rise to both disappointment and admiration:

Disappointment that such a big proportion of the older firms should have failed to make any noteworthy advance, being apparently quite satisfied to work to pre-war standards of power-to-weight ratio, accessibility, quietness and smoothness of running and cleanliness of design;

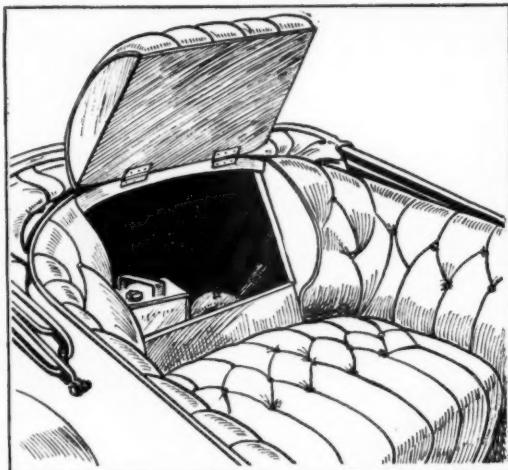
Admiration of the many who have had the courage of their convictions, scrapped pre-war designs in their entirety, and gone out for standards in regard to performance and other qualities far beyond their old ideals.

This difference in policy is very marked; there is rarely evidence of half measures—if we ignore the fitting of electric lighting and starting. The well-known cars are either almost unadulterated pre-war models, or absolutely new designs throughout. That, at any rate, is the general impression. Which policy represents the wiser course cannot be said off-hand, the circumstances applying to each case must be taken into consideration.

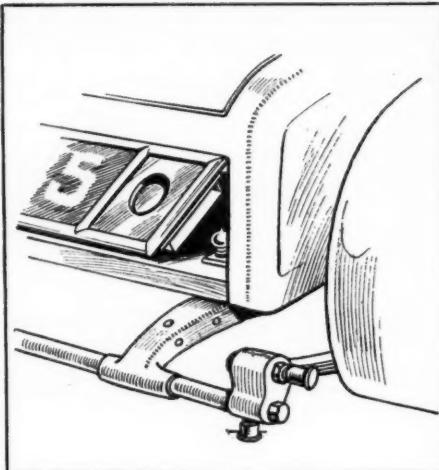
The continuance of a five-year-old model will, particularly in view of the present relative proportions of supply and demand, usually result in immediate financial advantage; existing jigs and tools serve to enable production on the old scale to be recommenced without delay. But where the output must be vastly increased to occupy a plant enlarged during the war to twice, five times, or even ten times its pre-war dimensions, there has been more inducement to start *de novo* and organize throughout for a proportionately increased output with a modern design lending itself to quantity production.

Austin, Siddeley and Wolseley are prominent examples of firms who are going out for production on a large scale (for England) with entirely new designs. Talbot, Vauxhall, Daimler and Rolls-Royce among others have decided to go ahead with slightly modified pre-war models. Rover forms an exception to the general rule, for although the type of car and the engine dimensions are identical in pre-war and 1920 designs, the new engine has little and the new gear box and back axle no resemblance to those details of the 1914 cars.

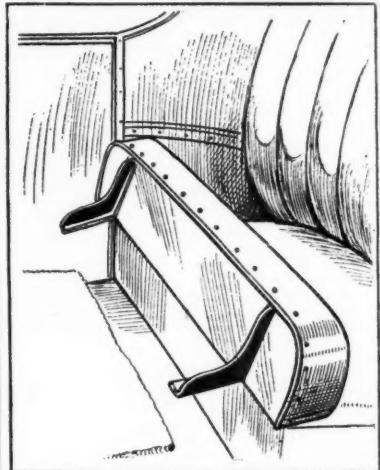
Besides the old established firms with new designs



Hinged back upholstery, disclosing tool space, on Calthorpe four-passenger body



Dawson rearlight and number form hinged cover of spare wheel compartment on two-seater



Hinged form of Standard driving seat to provide easier access to shaft, brake, etc., when floorboards are lifted

there is a number of new concerns with ambitious plans for large scale production. Among these are Angus-Sanderson, Ruston-Hornsby, Cubitt, Bean and Albert. Beyond these again are innumerable smaller projects, some with assembled propositions, others proposing to make their own designs.

BRITISH PRODUCTIONS

But very few of the British manufacturers, old or new, have yet commenced production on any large scale or have even reached anything like their projected rate of output. Vauxhall, Daimler, Rover, and one or two others are getting into their stride, or rather were doing so before the moulders' and ironfounders' strike, which has been running for six weeks at the time of writing, and has resulted in a cessation of deliveries of castings. Reserve stocks, where they existed, are now almost depleted; the output of cars is dwindling and must shortly cease, unless the strike is very soon settled.

Coming down to details of chassis construction, there is a tendency toward straightening out the side members of frames, avoiding the incurved front and the upswept back. Tubular cross members are taking the place of pressed steel in quite a number of cases, and in the latter connection the Daimler method of supporting the separately mounted gear-set is worthy of mention. The casting is slung from two single central brackets integral with the box, one each fore and aft, attached to two tubular cross members, torque on the indirect gears being resisted by an integrally cast arm which is bolted to the right-hand frame member.

In one case, the Armstrong-Siddeley, the usual form of pressed steel side member has been departed from. Frame sides on the lines of the Marmon have been adopted, deep members with narrow flanges being given lateral support by riveting to them pressed steel units consisting of the running boards and lower parts of mudguards.

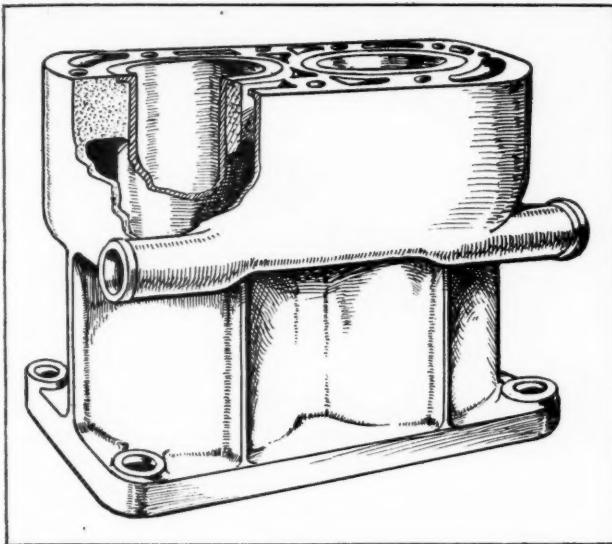
In regard to number of cylinders, the four shows no signs of being displaced from popularity, and though the

six has slightly more representatives it occurs in a smaller percentage of makes than before the war—the newcomers with few exceptions have gone out for the four. One firm, the Guy, has an eight, for although at least two others prepared experimental eight-cylinder engines, they have apparently made a final decision against them. England has no twelve-cylinder car, but a five and a three occur in the Enfield-Allday and Cosmos respectively. Both the latter are air-cooled radial engines of 10 h.p. for light two-three seated cars; Rover has also a new air-cooled two cylinder model. But air-cooling has not been adopted for anything larger than 10 h.p.

UNIFORMITY LACKING

There is little resembling uniformity in engine and gear-set mounting, although approximately 70 per cent of 1920 models have the two mounted separately, 25 per cent have the unit system of construction, the balance having the gear-set as a unit with either the propeller shaft or the back axle. Sub-frames are the exception, the engine usually being supported directly from the main frame side members and the gear-set by cross members when it is a separate unit.

Three-point suspension for engine and gear-set (separate or as a unit) is made a big "talking point" by many makers, but, in the majority of such cases, the system adopted has very little effect in relieving one or the other from frame distortion. There is no relative movement possible at the points of attachment, excepting in those cases—the minority—where a type of spherical trunnion bearing is provided as the single front support. The new Guy eight-cylinder has, however, a three point suspension for its engine and gear-set subframe which represents a genuine effort to counteract main frame distortion. The sub-frame is supported at the front in a central spherical bearing and at the back by two ball-ended brackets depending from a tubular cross member upon which they can oscillate. Each point of support therefore allows universal movement and the main frame



Ensign aluminum cylinder casting with steel liners

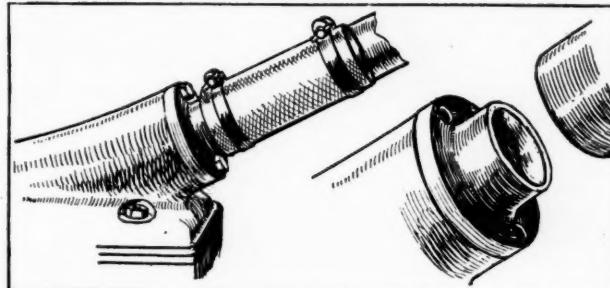
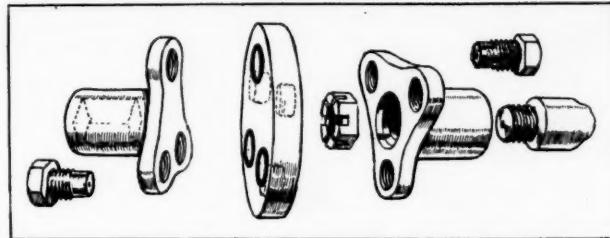
can be excessively distorted without stressing the bearer arms of engine or gear-set. Means of lubricating and adjusting the ball joints are provided in each case.

Cast iron cylinders are almost universal, though aluminum jackets with cast iron or steel liners are in evidence. The six-cylinder Napier is an example of the latter practice, the cylinder jackets being cast as a block with the upper half of the crank case and have pressed-in steel liners with aluminum pistons. The 12 h.p. Dorman engine (described in AUTOMOTIVE INDUSTRIES of July 3, 1919) is being used by about half a dozen firms, mostly small concerns that will turn out perhaps 250 chassis apiece in 1920.

DETACHABLE CYLINDER HEADS

One of the most noticeable tendencies is the widespread use of detachable cylinder heads for engines between 10 h.p. and 16 h.p. The cylinder block is generally cast as a unit with the upper half of the crank-case, the only exceptions among side valve engines being the Rover and the Guy eight, which have detachable heads and cylinder blocks bolted to the aluminum crank-case. In the Guy each block of four cylinders has two separate heads, these being set at an angle of 27 deg. from the horizontal, with the valves projecting in the other direction at an angle of 30 deg. from the horizontal. The head seats do not form water joints, the circulation from cylinder to head jackets being through exterior hose-connected elbows.

Overhead valves have progressed considerably since the last Olympia Show, and the system now has such well-known adherents as Napier, Armstrong-Siddeley (the latter used Knight engines in pre-war models), Arrol-Johnston (a side valve model also), Lanchester, Straker-Squire and Wolseley. Most of the firms named were not renowned in pre-war days for high-efficiency engines; they catered more for the class of buyer who desires the utmost refinement in running, and it can be assumed that they have not adopted overhead valves without having first assured themselves that they can satisfy their old type of customer while attracting others



Above—Rover coupling joint between clutch and gear-set. The plain-ended studs bed in rubber bushes in the central metal disk

Below—Detachable hose flange on water riser of Morris cylinder block

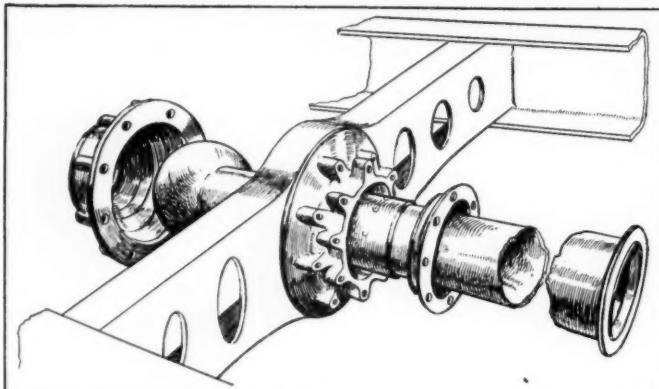
that look upon a high power-to-weight ratio as a first consideration. Makers like Lanchester, Napier, and Armstrong-Siddeley are not going to supply noisy engines because they are using valves in the head, even though some people endeavor to persuade themselves and others that overhead valves and noise are inseparable.

OVERHEAD VALVE ENGINES

A number of other firms, mostly newcomers, are making overhead valve engines, and taking them all together, it may be said that push-rod operation predominates; Napier and Straker are among the half dozen or so who are using an overhead camshaft, and with isolated exceptions rocking levers intervene between cams and valve stems. In the Dawson, a new-comer, the cams act directly upon the valve stems, the latter having threaded raps and lock nuts that serve for both spring retention and clearance adjustment.

The overhead valve seats are generally in a separate head, with seats integral or cast into aluminum pockets. Lanchester has the exhaust seat in the head, which is cast with the cylinder, and the inlet in a detachable cage; the exhaust valve is therefore removed by first taking away the inlet in its cage and then passing the exhaust down into the cylinder and out through the space vacated by the inlet. Armstrong-Siddeley has the cylinder and head in one piece but the head water jacket is a separate aluminum casting that carries the valve guides, rocking levers, etc., the valves being passed up through the cylinder bore to their seats in the head.

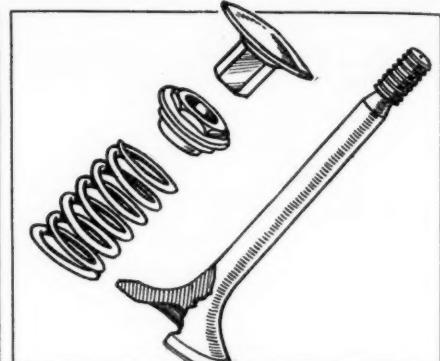
In four-cylinder engines the block casting has eliminated parts in all except one notable instance, the Talbot, which six-cylinder model also has pair-cast cylinders. Separate cylinders have not disappeared, even from line-ahead engines; Straker-Squire has them in the new overhead valve "six," though Austin, the protagonist of the separate cylinder pre-war, has gone over to the block.



Spherical head on its housing at front end of Ensign torque tube



Angus-Sanderson valve spring anchorage



Dawson overhead valve and spring anchorage, applies directly to mushroom nut

The Straker has each head integral with the cast iron cylinder and the units are braced together by a one-piece aluminum casting bolted to the top and carrying the overhead camshaft.

Mushroom and spherical-ended tappets are displacing the roller type, especially in the smaller engines, while large diameter cast-iron bearings for the camshaft, rarely less than three, frequently occur. The use of cast iron is not entirely on the score of cost; it is used by some designers on its merits, in preference to phosphor bronze or white metal, and does not appear only in cast iron crank cases where the upper half forms a unit with the cylinder block.

While the silent chain still has most adherents for the distribution, it is clearly losing ground, and the majority of really new designs have helical gears; where the chain is used it is generally adjustable, and, while this is clearly advisable, the desirability is doubtless one reason why the chain is being eliminated; the provision of means of adjustment adds appreciably to the cost without the system being any quieter in the end than skew gearing.

The transverse shaft for magneto and water pump drives is in evidence but not pronouncedly; a longitudinal shaft is far more prevalent, this usually being on the right, leaving the left, the valve side, clear.

The flexible disc type of coupling is very widely used for accessory drives, and frequently occurs between two

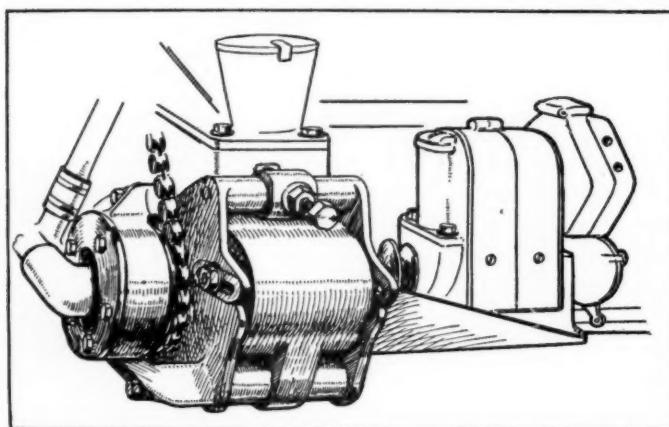
units driven in tandem; Sunbeam has the latter arrangement in one model, the drive to the dynamo passing through the water pump, both items well below the level of the valve cover plates on the left. Humber has an unusual method of coupling for the magneto, consisting of two discs with serrated edges coupled together by an internally serrated ring, which is prevented from moving endwise by a U-shaped wire spring whose curved portion lies in a groove, while its flat sides drop between the discs through slots in the ring. This arrangement provides a coupling with three good features, quick detachability of the magneto, easily and minutely adjustable timing, and sufficient flexibility to take up slight malalignment of driving and armature shafts.

VERMIER COUPLINGS

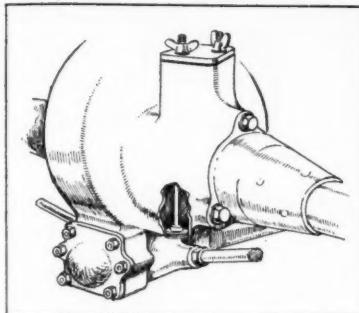
Vermier type couplings are often used, these consisting of two discs with an unequal number of holes drilled through their faces and held together by one or two bolts. But the flexible disc is more usual, variations of timing being made by shifting the primary star around the serrations on its driving shaft. Another method is to use an internally serrated sleeve, coupling the serrated driving shaft and a serrated boss on the armature shaft. This is a modification of the Humber method, but is more prone to wear rapidly and "chatter," while it does not allow such exactitude in timing.

Still dealing with engine externals, the two-unit lighting and starting system prevails in 95 per cent of British cars, belt drive to the dynamo and gear drive from motor to flywheel being the rule.

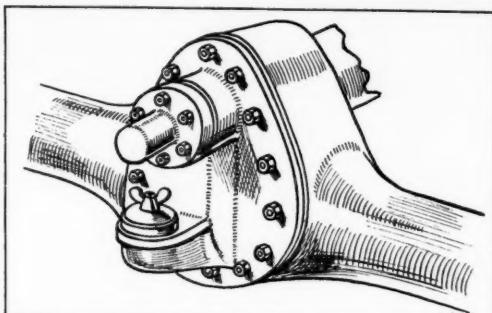
The triangulated belt, which passes over the driving fan and generator pulleys, is frequently seen, notwithstanding innumerable complaints from users concerning its inefficiency. It must be kept unduly tight if slipping is not to occur, owing to the comparatively small arc of contact that it makes with one or more of the pulleys; it therefore stretches quickly and requires tightening or shortening; the vicious circle then recommences. The link type of V-belt for fan and dynamo drives has proved quite satisfactory but only where a separate belt has been used for each purpose. And yet one or two designers have actually added to the work of the triangulated belt, by fitting a water circulation accelerator at the inner end of the fan shaft!



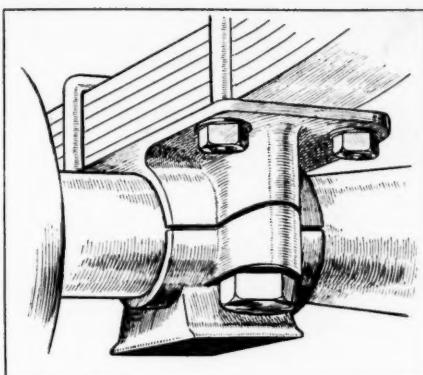
Austin distributor chain adjustment; water pump and magneto are supported by extensions of movable stirrup



Rover rear axle with oil level overflow; valve forms head of one bolt of filler cap



H. E. pressed steel rear axle design for overhead worm drive



Jack abutment under Swift spring clip

There will be very little acceleration of the water flow in such cases, unless the belt is tightened after each two or three hours running; nor will fan and dynamo serve their intended purposes with greater efficiency.

CARBURETERS

In regard to carburetors, the Zenith appears on 50 per cent of engines, the next in favor being the Smith, a British device made in two forms, one of which has four main jets and a supplementary starting and slow-running jet, all brought into action successively by engine suction, which lifts a piston that uncovers parts communicating with the choke tubes; the other pattern has a single jet and is a new model that appears on only a few engines.

Without exception the British side valve engine has its valves on the left in L-head cylinders; the T head disappeared with the separate cylindered pre-war Austin. In about equal proportions the carburetor is on either side and it cannot be said that the cored passage through the block from the carburetor flange on the right is more prevalent than a separate or integral induction manifold on the left. In the latter arrangement the heat from the exhaust branch is made use of in a variety of ways for vaporizing the fuel. There is no prevailing tendency, but methods without number are in evidence.

A few makers have endeavored to provide means for dealing with heavier fuels, by arranging a more or less efficient "hot spot" in the mixture passages; but there is nothing startling or really new in this direction, and it is evident that American designers have given more thought to this matter than have their British confreres.

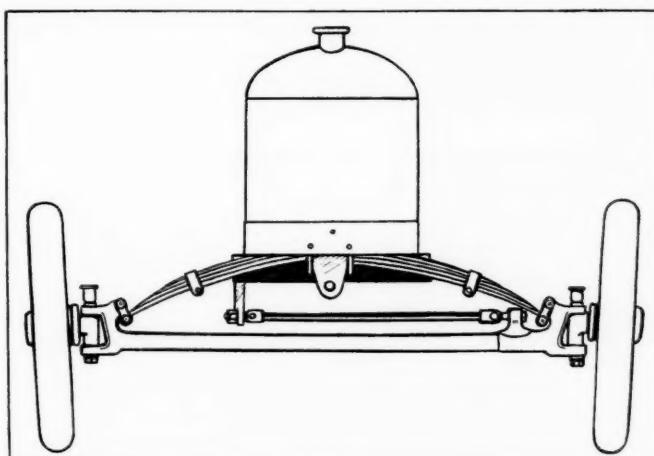
Air stranglers and air temperature regulators are conspicuous by their absence in the vast majority of cases; the users who imagine that the fitting of electric starters has overcome all cold-weather engine-starting difficulties will soon be undeceived; batteries will be ruined, and the starters will be blamed in nine cases out of ten, instead of the trouble being laid at the door of the car maker who has omitted to provide an air strangler or other means of giving a temporarily rich mixture.

The carburetors used on British cars do not enable the driver from his seat to adjust the starting jet to give a rich mixture temporarily, though one or two car makers—Napier and Armstrong-Siddeley, for example—have provided this feature on their own account. Rolls-Royce has an arrangement whereby fuel can be sprayed directly into the induction manifold as a preliminary to starting from cold. Rover has an air strangler. But these cars

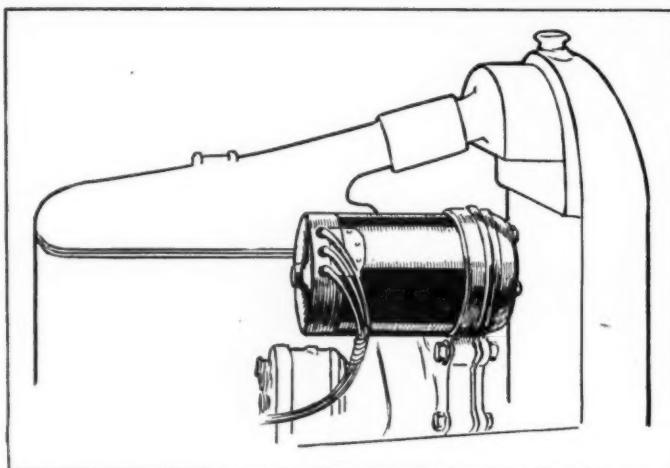
are exceptions; generally speaking no special provision is made.

The vacuum fed fuel system has made its appearance on British cars, but it does not predominate; gravity feed from a tank under the scuttle is still held in greatest favor, and the pressure system occurs in almost as many cases as the vacuum. Not infrequently one finds that provision is made for retaining one or two reserve gallons in the tank, this stand-by for emergencies being drawn upon by moving a special tap or placing the usual tap in a third position, distinct from the normal "open" and "closed" points of its travel.

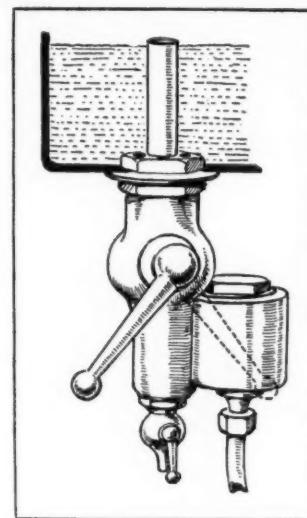
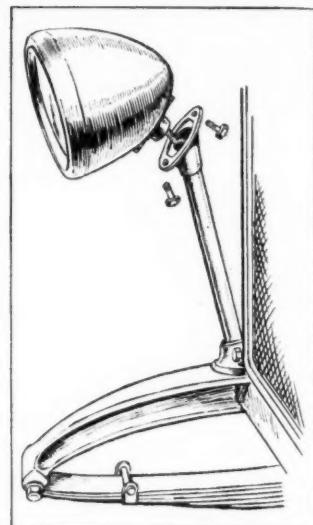
As regards the internal details of engines, four-cylinder crankshafts in engines of over $2\frac{3}{4}$ in. bore usually have three bearings, most of the smaller sizes only two, while in two or three instances—the Crossley is an example—a five-bearing shaft is found. In six-cylinder motors we find bearings numbering three, four or seven, these numbers occurring in Armstrong-Siddeley, Ensign and Napier respectively. Only one engine, the 12 h.p. Dorman, has a ball bearing crankshaft, a ball bearing being fitted at the front and a long plain bearing behind. White metal, either die-cast or run into brass shells, is practically universal for journal bearings and the same applies to big-ends, though in a few cases the anti-friction metal is run direct into the caps and connecting rod ends.



Lagonda transverse front spring and tie rod to prevent rolling



Dynamotor arrangement on 10 h.p. Humber

Combined fuel tap,
filter, drain cock and
"reserve-gallon" tube
on Autocrat fuel
tank.Rover headlamp and
tubular bracket

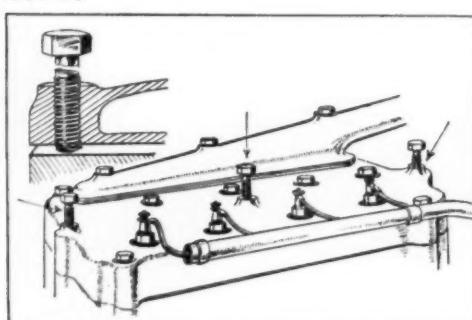
Die-cast bearings without shells have every appearance of being more widely used, for although they were tried and discarded by a few firms before the war, the troubles experienced were not due to any inherent defect in the principle, but on account of using an unsuitable alloy and failing to give sufficient support to the halves to prevent them from turning in the bearing housings. Die-cast big-end bearings, for example, were merely slightly grooved to allow one side of each big-end bolt to register and prevent relative movement; as a result, the bearings broke up. The trouble has been overcome by fitting brass shims 3-64 to $\frac{1}{8}$ in. thick, extending from between big-end and cap to between the bearing halves, the bolts clearing the white metal so that the latter need not be grooved.

LUBRICATION SYSTEMS

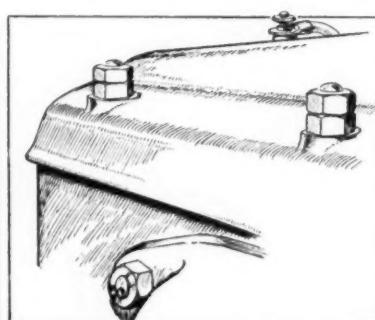
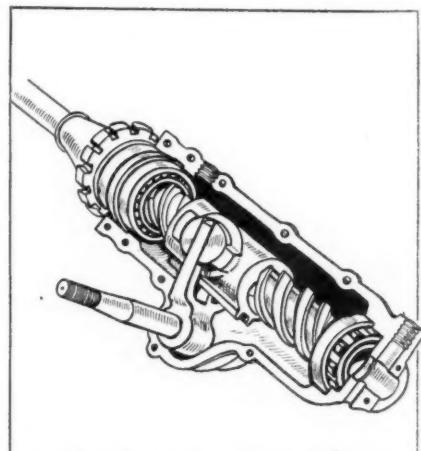
In one engine, the Austin, the usual practice with respect to crankshaft support is reversed, the bearings being supported by the bottom half of the crank case. Barrel type crank cases are also used not only with two bearing crankshafts, but in one instance where five bearings are used, viz., the Crossley; the crankshaft is threaded through a large hole at the rear end which is afterward covered by an end plate. In the Crossley the upper bearing halves are located in lateral webs of the case, the caps being bolted up from below, but in other examples of cylindrical crank cases the rear cover plate supports the back bearing while the front is housed in the front wall of the case, the shaft being threaded into it.

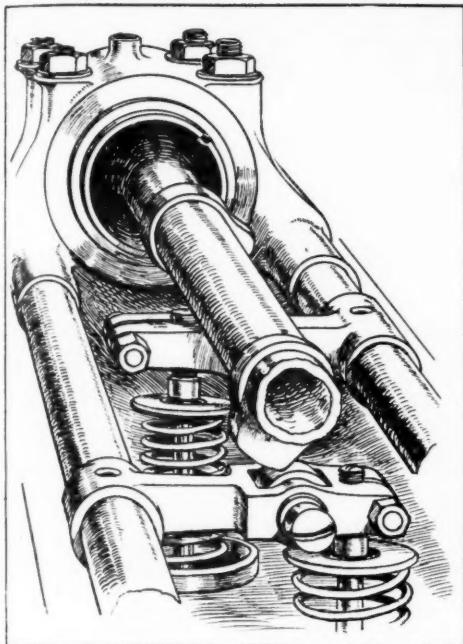
Engine lubrication systems can be divided into three classes. In the first of these a pump—usually of the gear type—delivers oil to troughs under the big-ends, splash being depended upon for all details, though troughs are usually formed over the main crankshaft and the camshaft bearings to catch the lubricant for these parts. The second system also has troughs under the big-ends, but, in addition, direct leads to the crankshaft journals and sometimes to the bearings of the camshaft as well. The third type has a drilled crankshaft through which oil is forced to main and big-end bearings, with leads to those of the camshaft.

The hollow shaft system is employed in as many models as the other two combined, and occurs in engines of all sizes. In comparison with pre-war practice it is clearly evident that trough and splash has lost ground; in fact, the simplest application (without leads to the crankshaft journals) has quite a small number of adherents. This may be due to the tendency toward increased engine speeds, with the resulting increase of inertia stresses and greater loading of the bearings.

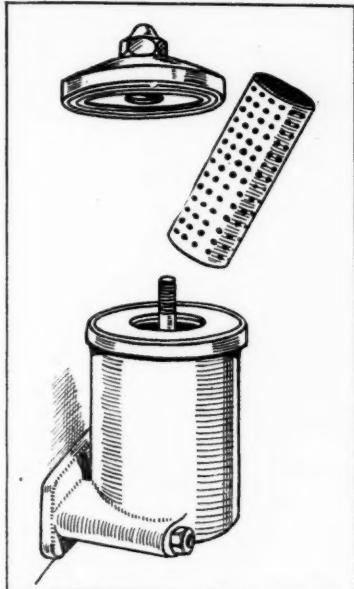


Detachable cylinder head with lifting bolts

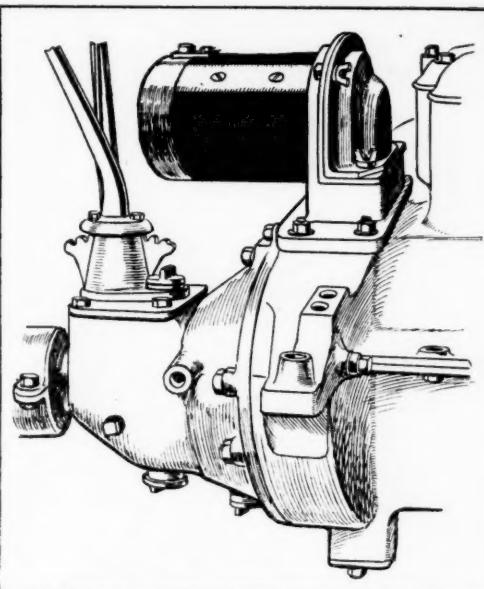
Vulcan detachable head
has lip to assist removalTalbot worm and nut
steering gear



Ensign overhead valve gear



Oil strainer on side of Angus-Sanderson crank



Lucas dynamotor rotates Morris crank-shaft through silent chain to sprocket in front of flywheel

Rarely indeed is the lubricant carried under pressure to the wrist pin, splash being depended upon for this part and for the cylinder walls. Napier and one or two others fit oil baffle plates between the crank throws and the cylinder bores, but this practice is not generally followed, and scraper rings on the pistons are relied upon to prevent excessive cylinder lubrication causing an undue amount of oil reaching above the pistons.

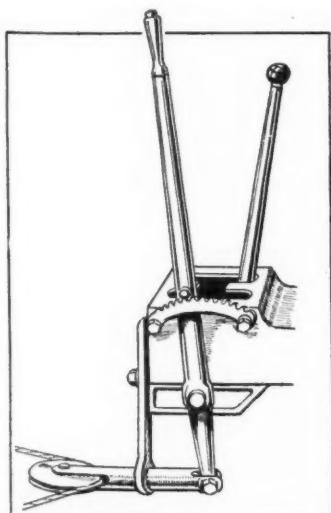
Both trough and hollow shaft systems have separate leads to the distribution when the latter embodies one or more chains, and in some cases a trough is also formed to retain oil through which the lower part of the chain will run. In hollow shaft systems the lead to the chain is frequently fed from the pressure relief valve, the surplus oil sufficing for the purpose. High oil pressures are

not prevalent, 20 lb. with the engine cold, falling to 5-7 lb. when it warms up being the usual range.

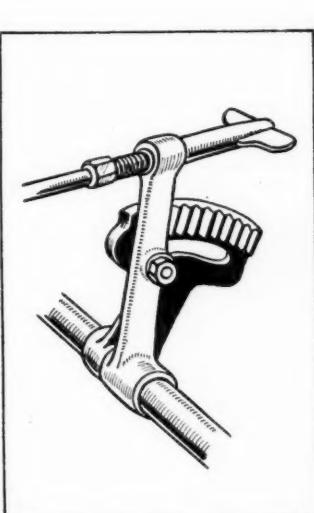
To the writer the wisdom of adopting the hollow shaft system seems dubious. Theoretically it is highly desirable, but whether it will remain so in practice will be dependent upon circumstances. Impurities in the oil more readily cause a restricted supply, for the holes in the crankshaft with their right-angle corners are rarely more than 3-16 in. in diameter, and will therefore be easily blocked by accumulations of fluff and carbon.

When the bearings are tight the excess thrown off to the cylinder walls may be more than the latter need; but the bearings will wear and be used in a very slack condition by many owners, who will not have them taken up until the noise they cause is past enduring. Meanwhile the cylinders will be flooded, and, as pistons and piston rings will also become slack, complaints will be loud concerning excessive carbon deposit and oil consumption.

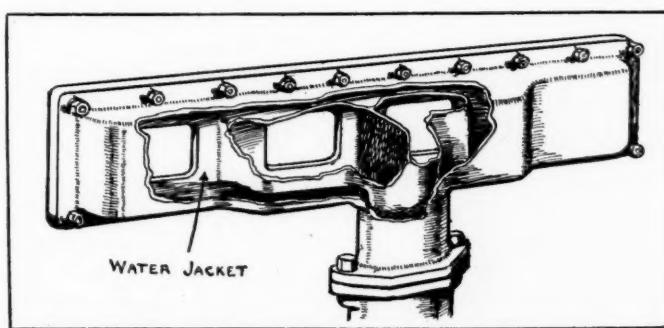
Further, in those cases—and they are not exceptional—where the oil is fed only to the two end journal bearings, the centre bearing and the two innermost big ends will, as wear occurs, be starved of lubricant owing to the pressure being reduced almost to *nil* before the oil reaches them. In the writer's own experience, he has met with several cases of melted centre bearings arising from this cause.



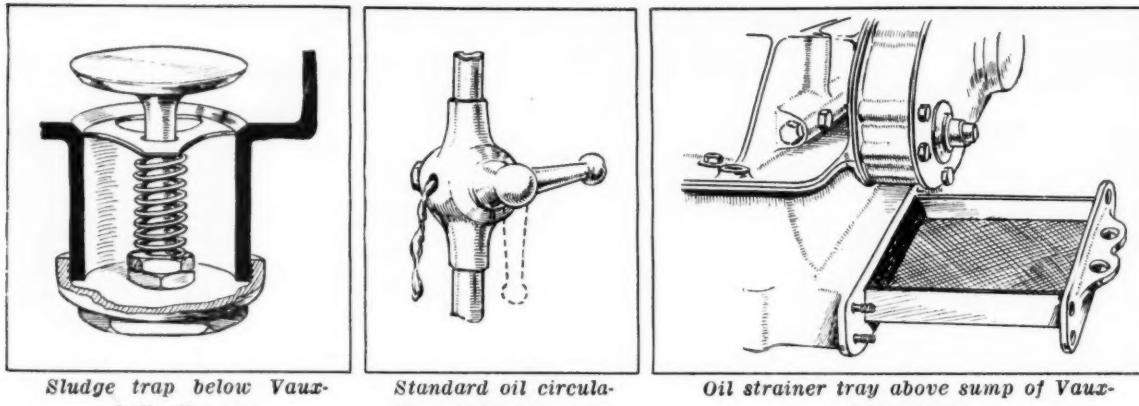
Compensating device of Lagonda brake application cable



Hampton brake adjustment and double levers on brake camshaft. Straight lever is loose on shaft and can be set back on quadrant lever when wing nut adjustment has been taken up



Two compartment and water-jacketed inlet manifold, coupled to dual carburetor on Ensign six-cylinder



Sludge trap below Vauxhall oil sump

Standard oil circulation indicating tap

Oil strainer tray above sump of Vauxhall engine

His opinion is that hollow shaft lubrication is desirable when an engine will be kept in good trim; but a motor that may be neglected—and the majority will not be overhauled frequently—is better provided with the simplest form of trough lubrication.

CONNECTING ROD AND PISTONS

With few exceptions connecting rods are of H-section with a pair of bolts for the big-ends. Napier and Siddeley have adopted tubular rods, while Austin and one or two others machine their rods all over. The Austin is a peculiar design in that the big-end is reduced in width to that of the webs of the shank, the white metal being run into steel shells the full width of the big-end bearings. The small end is also no wider than the shank and is slotted and fitted with a pinch bolt to hold the wrist pin. This design it is claimed enables the rod to be machined all over without difficulty and thus a better balance is provided.

Aluminum pistons have certainly gained in favor, but cast iron still predominates. Various reasons are given for refraining from the use of the light alloy. One maker says aluminum pistons are more liable to be damaged in the shops by careless workmen and that, although the defect may not in all cases be apparent to the eye, the piston may be sufficiently distorted to result in seizure or "tearing" when the engine is on test. He maintains that they are not a "production" job and has decided against them for that reason.

Another complains of the ultimate cost being so high on account of a larger percentage of "scraps," but apparently this is due to bad foundry work. A third thinks that users will protest against the noise arising from piston slap in a cold engine, while in another case there is a fear that wrist pin bearings and locking devices will be sources of trouble in use. But the most usual reason is an opinion that the saving in weight is so little as not to be worth considering, being only of advantage at high engine speeds.

THE ALUMINUM PISTON

Leaving these criticisms and opinions without comment, mention may be made of the straight-sided aluminum piston with an axially split skirt having a cast iron expansion ring inside, close to the lower edge. The ring serves constantly to expand the skirt to the full diameter of the cylinder bore, and the system is said to prevent piston slap, though clearly the usual large clearance is still necessary at the crown.

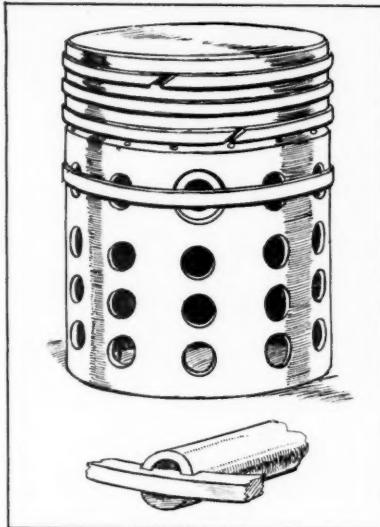
The Ricardo slipper type aluminum piston is used in three or four engines, but where aluminum is adopted the straight-sided design is generally favored. The piston pin is allowed to float in the bosses in some cases, though in one instance phosphor bronze bushings are cast into the aluminum. Steel pistons are used in two engines, one of these having the halves pressed and welded together on the vertical centre line.

Rings vary in number from two to five. Austin has the latter number, arranged in three grooves in an aluminum piston. Each of the upper grooves carries two narrow rings, while the lowest groove is beveled off on its lower edge, with small holes drilled through to the piston interior, the lowest ring thus forming a scraper. The last mentioned arrangement is in wide use, the scraper ring nearly always being above the piston pin, though, without the bevelled edge to the groove it appears at the bottom of the skirt in one or two cases.

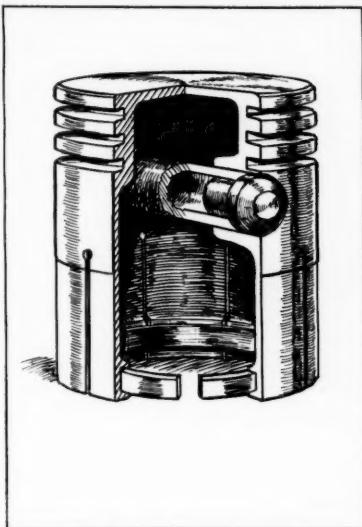
Sunbeam and Rover have a wide ring encircling the ends of the piston pin, the latter having grooved ends; thus rotational and lateral movements of the pin are prevented. With few exceptions, piston pins are hollow, but no general tendency can be named in regard to their fixing. Some are not held at all, except from lateral movement by a brass or aluminum plug at each end, but float in piston bosses and a bushed small end. The latter system is quite prevalent; a modification consists in replacing the plugs by a spring wire ring located in an annular groove at each end inside the bore of the boss. Taper-ended set screws through the bosses, with parallel-sided or taper-ended pins, have not yet become relics of the past, though their demise appears to be in sight. The Crossley method stands alone and consists of a hollow pin through the bore of which passes a long $\frac{1}{4}$ in. bolt, the head and nut tightening up against washers that bear on shoulders formed by the ends of an enlarged diameter of the bore of the boss. The pin floats in the small diameter but cannot move endwise.

Ignition has not yet been mentioned, but it can be dismissed in a few words. The magneto is all but universal; only two makers, both newcomers, are depending solely upon the battery and coil system, though the latter appears as a supplementary and entirely separate ignition on Rolls-Royce, Napier, Lanchester and Ensign, the latter a costly six-cylinder, overhead valve and camshaft proposition, introduced by a new firm with good connections in the engineering industry.

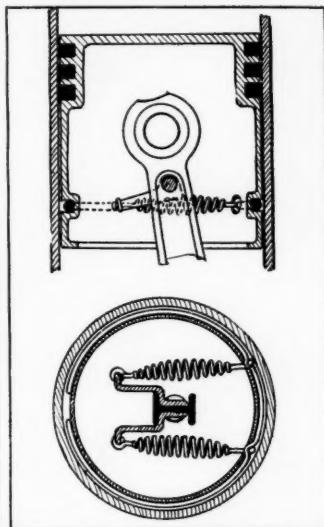
In regard to water circulation, there is a distinct tend-



Rover piston with fourth ring locating wrist pin



Humber aluminum piston with split skirt and internal ring to prevent piston slap.



The Crossley connecting rod

ency toward a return to the pump, or rather to adopt the modified form of pump known as a "water accelerator." The latter is belt driven and usually has its impeller on an extended rear end of the fan shaft, located within a housing bolted to an opening in the front of the cylinder water jacket. The housing forms a unit with the intake elbow and the impeller is supposed not to interfere with the flow of the water if the drive be disconnected and thermo-syphonic circulation be depended upon.

THE RADIATOR

Vauxhall was the originator of the system, but has now a number of copyists. In some cases it is a fairly efficient belt driven pump, but in others it does very little more than churn the water and will not lift the latter out of a pipe with a head of more than 8 or 10 in. In its better exemplifications it undoubtedly forms a good substitute for a direct driven pump, and has the advantage of a drive which will not cause damage to the impeller if the latter be frozen up in winter when the engine is first started.

As to radiators, the honeycomb type is evident on the majority of cars; it is frequently supported in trunnion bearings that serve to relieve it from some of the ill effects of frame distortion. Armstrong-Siddeley has adopted the separate outer sheath in connection with a distinctive V-fronted rearwardly inclined pattern; but the composite case and shell are the rule, with rounded-off top tanks and, occasionally, V fronts.

COMPARISON WITH FRENCH

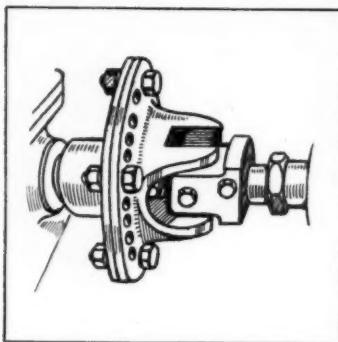
British engine design generally does not compare favorably with the new French and Italian products in outward appearance. There has not, in fact, been the same striving after a neat external aspect, and dynamos and motors, for example, are not tucked away and rendered so inconspicuous as they are in many Continental designs. The prevalence of the belt drive for the dynamo is accountable to some extent, but more so is the great demand among British users for accessible details.

A "pretty" engine is undoubtedly attractive at a motor show, but users have found from experience that a neat appearance often involves inaccessibility. From the British standpoint, home products constitute a practical compromise, and, while it is admitted that few of them show up well beside a great number of French and Italian cars, it is claimed that their details are better arranged and more accessible than is the case on most of the American cars imported into England. Probably the latter are handicapped by the fitting of the steering on the right, when the original design provided for it on the left; but the fact remains that inaccessibility and lack of neatness under the hood is a frequent criticism of American products as used in England.

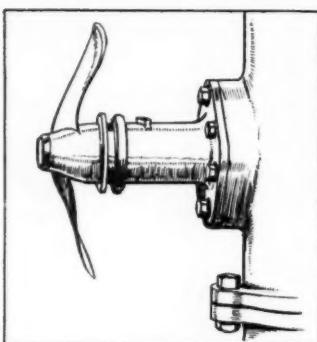
THE CONE FLUSH

Turning to transmission, the cone type of clutch leads in favor, taking together the internal and external patterns. Leather facings are more often used than fabric and some means of adjusting the spring or springs is generally provided. But the disc or single plate clutch is widely used and the multi-plate occurs in six or eight cases. There are no signs of the cone type being discarded, and among the post-war designs it appears quite as frequently as in the modified pre-war chassis. Efforts are apparent, however, in the direction of reducing the weight of the driven member, which is very frequently of aluminum bolted to a flanged driven shaft, a pressed steel cone being a rarity. In regard to the single disc, this also is occasionally of aluminum, more often of steel, while in one instance it consists of a disc of fabric bolted directly to the driven shaft flange.

In a few cars more attention has been given to the lubrication of the pilot bearing when this is of the plain journal variety, for it has been remarked that users' complaints concerning difficult gear changing are frequently due to neglect to lubricate the pilot bearing with oil-can or grease gun. In a few hollow crankshaft lubrication systems the rear extension of the shaft is drilled to allow oil to reach the pilot bearing; as, for instance, in the new



Sunbeam magneto coupling, with leaf spring taking the drive



Fan designs for use behind V-front radiator

15.9 h.p. Humber, where a wick is arranged in the hole to prevent an excessive amount of oil passing through and flooding the clutch. In another example—the Armstrong-Siddeley—the pilot is surrounded by a concentric chamber into which quite a large quantity of oil can be introduced and serve to lubricate the bearing for several months without replenishment.

GEAR LEVERS

Ball bearing pilots are increasing in number and remove the necessity for providing unusual means for lubrication, an oil hole or greaser generally sufficing, and no great harm results if either be neglected by the user.

Where the engine and gear-set are separately mounted, in main or sub-frame, two flexible joints, one at each end of a coupling shaft, are rarely omitted. Mostly they are now of the fabric, leather or steel disc type, though Sunbeam, for example, has metallic joints, one sliding pot and one star type.

Centrally placed brake and gear levers are in evidence on British cars for, practically, the first time, notable examples of this arrangement being Austin, Armstrong-Siddeley and Napier. These are among the cars of entirely post-war design, but the majority have retained the right-hand side position, even many of the makers, such as Lanchester, Straker-Squire and Humber, who have scrapped their pre-war models.

The central lever admittedly simplifies the provision of an entrance on each side of the driving seat, but many users object to the left-hand control as such and point out that a right-hand entrance is possible of attainment with side levers and is occasionally provided. But the obvious advantages of the central lever from a manufacturing point of view will certainly override any objections that users may put forward, for after all they are not of vital importance, and though certain disadvantages are apparent they have their compensations.

Four speed gears are almost as numerous as three speed, and in all sizes of cars both are in evidence. There is no general tendency, the makers' own inclinations deciding which number shall be provided. We have four speeds on the smallest and also on one of the most expensive—the 700 lb. A. B. C. and the Rolls-Royce respectively.

The primary and driven shafts of the gear-set run almost invariably in ball bearings, and a great many layshafts are similarly mounted. But the latter more usually run in plain journals; in one or two instances

the layshaft is stationary and the gear sleeve is mounted on it with a long floating bush intervening.

Pilot bearings are equally divided between ball and plain, and though roller bearings are used in one or two gear-sets, both for pilot and mainshafts, they form a very small minority. The primary shaft carrying the driving unit of the constant mesh gears is supported in two more or less widely spaced ball bearings as a general rule; the Armstrong-Siddeley is one exception, for only one ball bearing is used of this shaft, but the pilot is continued through the full length of the hollow driven shaft, being supported therein by two roller bearings.

Thus, not only is a very long pilot bearing obtained, but the primary shaft has still more widely spaced points of support and a shorter box results. The casing in this instance is bolted to the flanged front end of the tubular propeller shaft casing, the front extremity of the unit so formed being attached by a bracket and spherical joint, on the left of the centre line, to a stiff cross member of the frame.

A permanent drive for the speedometer is taken from a gear wheel in the transmission case in a minority of cars; in other instances a pulley is arranged outside, on or adjacent to the gear brake drum. But these special provisions occur mostly on cars with enclosed propeller shaft; when the latter is open a pulley is clipped to the shaft itself in nineteen cases out of twenty.

As in France and Italy, so in England, the Hotchkiss drive has clearly lost ground, and the enclosed propeller shaft occurs on the majority of cars; the open type is nevertheless still greatly in favor and over 40 per cent of all British cars are so equipped. The Hotchkiss drive should be less costly to produce, despite its requiring two universal joints for the shaft, and clearly one must turn to some other reason than cost for its decline.

CANTILEVER SPRINGS

The wider use of cantilever springs is probably accountable, for if we ignore cars with these and the quarter elliptic type, considering only those with semi and three-quarter elliptic springs, we find that 74 per cent have Hotchkiss drive and 26 per cent enclosed propeller shafts.

The flexible disc type of universal joint appears at the front end of many propeller shafts of the open type, a pot type of sliding joint usually occurring at the rear. But star joints at the front are more in favor for both open and closed shafts. A few of these joints have ball bearings (Daimlers are so equipped), and in the majority of cars of medium and high-grade, special provision is made in regard to lubrication.

By one method or another the oil in the transmission casing is allowed to reach the joint case, the front half of which may consist actually of a hemispherical extension of the transmission casing in which is supported the spherical front end of the propeller shaft tube. Oilways drilled through the driven shaft of the box represent another plan, the oil reaching the joint casing by way of radial holes in the threaded end and nut which hold the front fork of the joint to the splined or castellated end of the shaft.

In any event the front joint usually has a metallic oil tight casing, or, in the absence of the latter, some

more satisfactory means of retaining the lubricant than a laced-on leather bag—a fitting which was very frequently used before the war. A concertina form of leather covering used on one or two cars is fairly effective for open shaft joints. This consists roughly of a series of three or four leather rings, of 4 to 6 in. outer diameter, stitched together alternately at their outer and inner peripheries. The ends are secured to shaft and joint cover respectively by metal clips, and the fitting serves to retain lubricant without bulging or becoming distorted in shape at high speeds of rotation, and allows universal and sliding movements.

Occasionally both joints of open propeller shafts are of the star type, sliding motion being allowed on one of the castellated ends of the shaft. In enclosed shafts a sleeve coupling is generally provided between the rear end and the pinion or worm shaft, allowing for fractional want of alignment or discrepancies in length of propeller shaft casing.

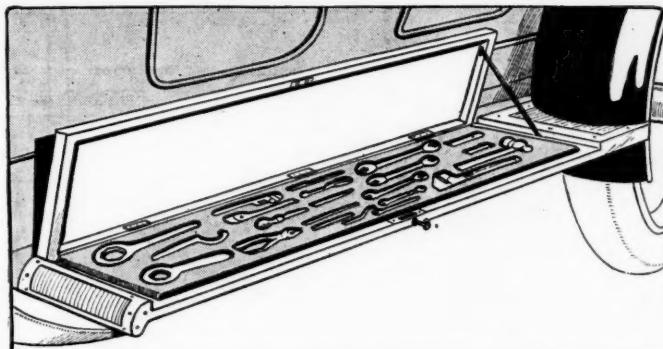
HELICAL GEARS

There can be no question as to the increasing popularity of helical bevel gears for the final drive. Both the worm and the straight-toothed bevel have given way before it, and not many years will elapse before the presence of either of the others will call for remark. The Citroen, or herring-bone, bevel has not appeared in British cars, and there seems no reason to suppose that it will compete with the Gleason. Nearly all the newcomers have adopted the latter, which also appears in the post-war designs of well-known makers. Daimler retains the Lanchester worm and the new Lanchester car has it too. Altogether under a dozen forms are using worm drive (straight or otherwise) and the Gleason gear has so far advanced that approximately 50 per cent of the remainder have adopted it. And yet it had hardly appeared on British cars at the last Olympia Show.

Ball bearings throughout the rear axle are far more widely used than the roller type. A few firms use both Timken roller and ball. Splined or castellated shafts are general, but here again Armstrong-Siddeley has striven to advance by adopting a combination of plain taper and splining; the outer ends of the axle shafts are threaded, parallel splining abuts and a short, plain taper follows before the normal section of the shaft is attained. This plan has been adopted at quite a number of points in the chassis—in the engine, steering, brake connections at other parts besides the axle. It has the advantages of the taper and feather key arrangement without the drawback of a loose key, and ensures a firm concentric contact between driving and driven members without liability for backlash arising in use. It is claimed, in addition, that the arrangement eliminates hand fitting and provides the ideal in respect of interchangeability.

Honors are about equally divided between the full floating and semi-floating types of axle. Some firms have varied their designs in one direction, some in the other. Lanchester, for example, who before the war was a strong advocate of the semi-floating pattern, is now supporting the rear wheels solely on the axle casing by one double row ball bearing and one roller type.

Springs are of all kinds. Wolsey has two models with quarter elliptics back and front, the two-seated 10 h. p.



Tool-box forming top of left stepboard on Vauxhall

and the light "four," the latter a newly designed chassis with overhead valves, designed throughout for quantity production and a high power-to-weight ratio. The 10 h. p. is an improved pre-war model and has been looked upon as the best sprung light car on the British market—hence the adoption of the same system of suspension on the newer and larger chassis.

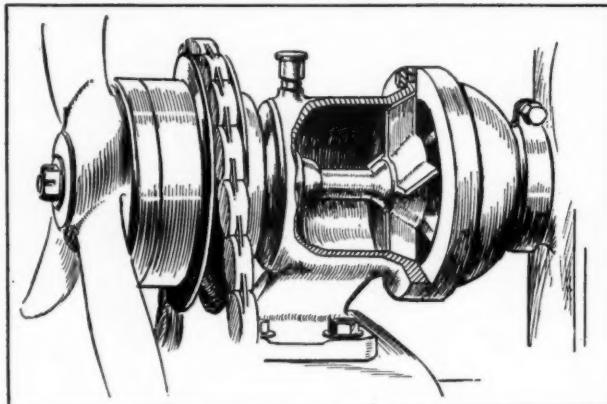
Cantilevers have gained a number of adherents, and nearly all the new-comers are so fitted. But semi-elliptics still hold sway, with the three-quarter pattern represented in a few instances. Only one example of the full elliptic rear spring occurs, on one of the two Arrol-Johnstons, where it appeared prior to the war.

SIDE BRAKES

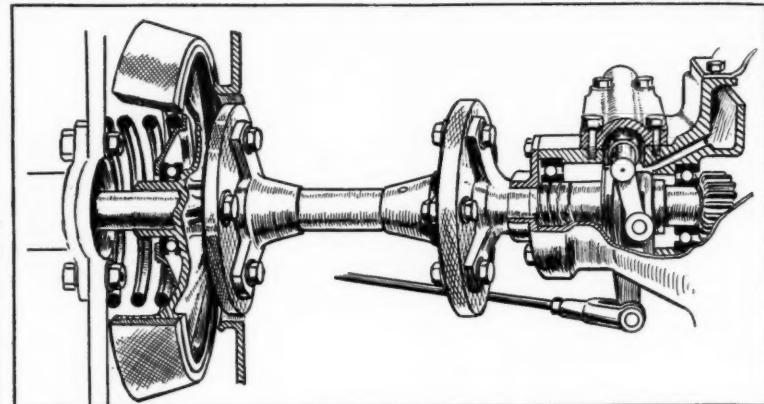
A number of British makers have followed the lead of America and have fitted both sets of brakes on the rear wheel drums. But they are almost invariably of the expanding type and are arranged side by side within the drums; the form in which the two sets of drums and shoes are concentric has appeared only on Rolls-Royce cars among the well-known makes. Only two notable examples of contracting bands on the rear wheel drums are in evidence, the Daimler models and the two-seated 10 h. p. Humber. The Daimler is also peculiar in that the push-on side lever applies the bands on the transmission brake drum, while the pedal operates the two on the wheels.

Approximately 50 per cent of 1920 cars have transmission brakes, actuated by pedal, these being mostly of the contracting shoe types as opposed to the expanding pattern. A feature to be noted is the greater accessibility of adjustments, while in several instances provision is made in various ways for resetting the angle of the levers on the brake cam or toggle shaft. The latter plan enables the initial leverage to be regained without fitting new liners in place of those only half worn out. Fabric liners are more frequently used than those of metal, and these have given satisfaction not only in respect of wearing qualities but in the greater ease with which they can be renewed.

The fitting of compensating devices for the wheel brakes is less prevalent than before the war, most makers being content to provide individual and accessible adjustments. There is a need, however, for adjustable stops for brake operating levers, especially when a compensating device is fitted; as things are now, there is a great tendency—owing to unequal friction in the bearings of rods, levers, cams and toggles of the two wheels—for one pair of brake shoes to be pushed widely clear



Humber combined fan bracket and water circulation accelerator.



Humber clutch cone, coupling shaft, and clutch withdrawal mechanism in front extension of gear-casing

of the drum while the other set is constantly rubbing the surface of the other drum. Thus squeaking or scraping is evident and this would be avoided if each set of levers, etc., had an adjustable stop to prevent it being pushed off too far.

Steel cables are used for operating the rear brakes of three British chassis, the Austin being an example which is not followed by other firms of renown.

The wooden wheel has almost disappeared, its place being taken very largely by the hollow pressed steel pattern. Wire wheels have, if anything, lost ground and where they have been superseded the disc wheel has been adopted. There are two prevailing types of the latter; the form wherein a corrugated disc is used and the single flat disc type, the Michelin. Armstrong-Siddeley here also has something different—a single flat disc welded to the outside edge of the tire rim and having a large diameter central hole. The disc is secured at the

rear axle to the brake drum, and at the front to flange extensions of the hubs, by a series of studs and nuts. The dished effect is taken advantage of to prevent bearing overhang on both axles and to provide a central and vertical steering pivot pin. True centre steering is thus attained, with no lateral thrust in normal running on wheel bearings or pivot pin bushes.

Detachable wheels of one type or another are universal; only one firm has announced demountable rims and these will be mounted on detachable wheels. Tires are all of the clincher pattern, the straight-side cover not being made by British tire manufacturers.

The majority of steering gears are of the worm and full worm wheel type; a few worm and segment gears remain, while the square thread and nut is used by two firms. The Marles steering, in which snail cams on the column operate against ball bearings at each end of a T-headed lever, is used by Ruston-Hornsby.

Rotary Cultivating or Ground Milling Machines

THE rotary cultivating machine is the outcome of the system of "dry farming" which has given wonderful results in parts of the country where the rainfall is deficient, and experiments abroad have been so far satisfactory that the system is rapidly extending in North Africa as well as in the south of France. The object of the rotary machines is to pulverize the soil, leaving it in a granular condition, so that there is little evaporation of the moisture. The surface has to be kept in this granular state by repeated harrowing.

Many rotary machines have been produced, nearly all with rigid tools which broke through contact with obstacles, and the only mechanism of the kind surviving is the Somua, so-called after the initials of the Schneider group in France by whom it is constructed. It was originally designed many years ago by a Swiss engineer, who adopted flexible tines of steel wire, of which a considerable number rotate on a shaft. At the demonstrations of St. Germain and Senlis, the Somua machine left the ground in a good granular condition. It is claimed that the system is suitable for all soils and all climates, but as weeds are generally uprooted and left on the surface, they require dry weather

to destroy them, and should heavy rains follow the pulverization the surface is liable to become quite impervious. It hardly appears likely that the rotary machine will render much service outside dry regions, except in the case of small machines specially built for horticulturists and market gardeners.

New Storage Battery Jar

FOR use in batteries designed for the propulsion of industrial trucks and tractors and electric mine locomotives, the Electric Storage Battery Co. has developed a new jar for which unusual strength is claimed.

The "Giant" jar of the "Ironclad-Exide" battery is made of a semi-flexible compound, exceptionally tough and strong. Tests have shown that these jars will stand a pressure of 2,000 pounds at their weakest point, whereas the old type jar broke at less than 1,000 pounds; and that an electrical test of 30,000 volts does not puncture the "Giant" jar.

Mechanical Engineers Discuss Automotive Trend

This discussion is probably the more interesting because it is more or less unexpected. Previously the A. S. M. E. has not gone deeply into automotive topics but at the recent annual meeting the Hvid engine was discussed with a view of automotive work and considerable time was given to super-induction, wrist pin bushing and ball bearing practices

By Gustave Wiedeman

IN view of the fact that more than one-third of all the technical papers presented at the recent annual meeting of the American Society of Mechanical Engineers overlapped into the domain of the automotive engineer, it is quite natural that the ensuing discussions developed information that should prove of interest to readers of AUTOMOTIVE INDUSTRIES.

At the session of the Gas Power Section, first consideration was awarded to Hvid oil engine practice. The very lively discussion following the presentation of this paper was marked by the participation of Professors Lucke and Greene and of representatives of Diesel and other oil engine interests. Classification of the Hvid engine was the first subject taken up. That it should be listed among the "solid injection types" did not please the author of the paper but it seemed to be the most logical classification.

To many it seemed that the very small ejector holes must give trouble from carbonization, but the author stated that there had been no such trouble and that this was due to the great velocity of the oil and gas passing through these holes. Furthermore, it was stated that a single cup would handle quite a range of oils and that a few cups would meet the requirements of any fuel from kerosene to an oil that will barely flow.

An inquiry brought the information from the author that 420 lb. p. sq. in. compression is the usual practice with kerosene, and 470 lb. p. sq. in. with heavier oils. The smaller units (including 8 h.p.) can be easily started by hand, while for the larger units, especially marine installations, compressed air is necessary. It appeared that up to the present the field of application of the Hvid has been quite limited, covering farm, stationary and marine work.

The author stated, however, that he had tried experiments with the automotive applications in view; that a speed of 1500 r. p. m. could be easily maintained and that the "pick-up" and the "bull-dog" characteristics of the engine were more satisfactory than the characteristics of present gasoline engines under conditions of constant load. He added that under varying load the engine was not as flexible as the gasoline engine.

Delay in the printing of the papers was probably responsible for the fact that there was no adequate discussion of the interesting papers of Messrs. Cammen and Seaton, but it was, nevertheless, evident that super-induction was a live subject. Mention was made of the difficulty of applying theory to some of the combinations possible in the practical working out of superinduction.

As the chairman of the Machine Design Section expressed it, the discussion following the rotary compressor paper reminded him of old times. That reliable compressions of even 500 lb. p. sq. in. should be obtained at good efficiency was ample cause for the enthusiasm expressed in the discussion. Much time was consumed in making clear the principle of operation. Prof. Lucke pointed out the difficulty of trying to obtain more than a maximum of 500 lb. pressure in one stage, and Prof. Greene reminded the audience that since the compressed fluid passes through the working chamber, there are limits to the use of the machine, imposed by fluids and gases which would in any way affect the oil lubricating the chamber.

It was also pointed out that, since the exhausted gases or liquids had to pass in between the balls of the cylinder bearings, the lubrication at this point was bound to be faulty and that the acid or grit must be prevented from finding their way to the balls. The author of the paper stated that at present only one extended use was made of the compressor, in refrigerating work. He also stated that the volumetric efficiency at full load was over 90 per cent, and the overall efficiency 74 per cent, including the electric drive. A question relative to the 103 per cent. volumetric efficiency at no load, mentioned in the paper, remained unanswered. The compressors used at present range in capacity from $\frac{1}{2}$ to 100 cu. ft. per minute.

The general practice of oil grooving was dissected by Bierbaum, Norton and others in the discussion following Bierbaum's paper, in which ideas were advanced that seemed to be heartily endorsed by the meeting. Oil grooving was shown to be an art in itself.

Bierbaum contended that the ordinary shaped groove did more to break the oil film than to form it. That the groove should be at right angles to the direction of motion and not in the line of maximum thrust, was also emphasized. This whole matter of grooving seemed to "strike home" in the automotive industry. Some of the babbitted shells are not made of the proper section, but are too deeply arched on the backs, according to the views of some of the speakers. Often babbitted and brass bushings and bearings were tooled for grooves after the major reaming has been done, and this was given as the principal reason for poor oil filming in many cases.

Wrist-pin bushing practice was especially condemned. Unfortunately the examples shown for illustrations were

'Continued on Page 1181)

The British Motorcycle Trials

In the following interesting account of official British trials, perhaps the foremost contest of the kind, Mr. Bourdon has given much interesting details of motor cycle manufacture and development. The American cars fared very well in this competition. The comment on the prices of the machines and the references to the cycle cars are interesting

By M. W. Bourdon

THE 82 machines that finished out of 111 starters in the reliability trial organized in September, by the Auto Cycle Union (the ruling body in matters pertaining to motor cycles in England and Wales) lost 17 per cent of the maximum number of marks attainable. These deductions as shown by the judges' report just issued, were made for the following reasons and in the percentages named:

	Per Cent
Deviation of schedule	13
Loss of efficiency	19
Stops on hills	9
Brakes defective at end of trial.....	7
Inefficient mudguards	7
Noise	18
Additional defects revealed during final examination	27

Seven American machines were entered, but only five started, viz.: 2 Harley-Davidsons, 2 Indians and 1 Henderson. The latter retired during the second day's run; one Harley-Davidson gained a gold medal with 182 marks out of a possible 200, the other retired on the fourth day; both Indians finished, one with 156 marks, which secured for it a bronze medal (third class award) and the other with 127 marks (no award).

The trial—which is considered the great event of the British motor cycling year—was the thirteenth of a series which commenced in 1903. Great advances in design and performance were expected to reveal themselves after five years' interval which had occurred since the trial in 1914. A number of post-war models were making their first public appearance, and the judges' report, which has been issued during the Olympia Motor Show, and a fortnight before the opening of the Motor Cycle Show to be held in the same building (November 24-29), has been awaited with keen interest by trade and buyers alike.

Participating machines ranged from "lightweights," with 250 cc (15.25 cu. in.) single cylinder two stroke engines, turning the scale at 170-200 lb. fully equipped, to sidecar outfits with two-cylinder engines of over 1100 c.c. (67.1 cu. in.) and weighing up to 680 lb. Three-

wheeled light cars—which are legally motor cycles in Great Britain—were also admitted as competitors. These usually have two cylinders, air-cooled motor cycle engines, tubular frames, two steering wheels in front, one driving wheel behind, a narrow seat for two passengers including driver, and weigh about 800 lb.

The two-stroke "lightweights," it may be said incidentally, are gaining considerable popularity in England, and several of the best known makers (Triumph, for example) are having comparatively big sales of this class of machine. Crankcase compression is adopted, with inlet and outlet ports uncovered by the piston near the bottom of its stroke. The engine usually has a bore of about 2½ in. and a stroke of 2¾—2½ in. With two-speeds and belt final drive they mostly sell in England at \$250—\$300, though a few are offered at \$150 or so. But although the lower-priced meet the very heavy demand as regards first-cost, the weights are considered far too heavy and the maximum should be nearer 100 lb. than 200 lb. to enable the machines to be viewed as true "lightweights."

DIFFICULT COURSE

To return to the Trial. It was held on a course radiating from Llandrid. Wells, a well-known health resort in Mid Wales. Each day's run started from and finished at that town, and the routes, without exception, entailed exceptionally severe stresses upon both machines and riders, owing to the extremely hilly and badly surfaced roads. Long stretches were merely tracks over the Welsh mountains, strewn with loose stones and boulders, or lined with 12 in. ruts. Lengthy gradients steeper than 10 per cent were normal, the climb of one mountain pass, for instance, involving a rise of 1790 ft. in two miles with several "hair-pin" corners having gradients of 20 per cent and loose surfaces of rock and stone.

The total distance covered was 732 miles in five days' actual running, the sixth day being given up to the judges' examination of "finishing condition." It was considered that the strenuous nature of the trial caused it to resemble in results the effects of three years' normal use in Great Britain, and to simulate conditions obtaining in countries overseas where made roads hardly exist

outside the towns. British motor cycle makers are going out for a big export trade to South Africa, Australasia, South America and elsewhere, and the desire was to show prospective buyers in those countries what present day machines can do in the service of "rough riders."

Reliability was judged by the ability of each machine to keep to schedule, only a small margin being allowed between minimum and maximum times over the sections into which each day's run was divided. Under this heading the showing was considered distinctly good.

Tests of acceleration and maintenance of efficiency were conducted simultaneously and called the Consistent Driving Test. The latter was not a great success. Each rider was called upon on the second day to make a slow run (not exceeding 10 m. p. h.) up a part of a stiff hill, and a fast run up the remainder, various maximum speeds applying to the different classes. On the last day the riders were asked to repeat their performances with as narrow a margin as possible, but the test resolved itself into a trial of the rider's ability to judge speed rather than an exhibition of maintenance of efficiency.

The hill-climbing tests made it clear, in the judge's opinion, that efficient cylinder cooling has not yet been attained in respect of aircooled engines, or after long climbs on low gear there were unpleasant evidences of noise, smell, heat and liability to knock. The water-cooled machines, on the other hand, behaved satisfactorily.

OFFICIAL COMMENT RECOMMENDED

The official remarks concerning brakes are very scathing, and the view is expressed in many cases to ensure absolute safety. The Indian machines, however, received favorable comment on account of their brakes.

Mudguards are damned with faint praise as regards their efficiency and then criticised severely as to the methods of securing them.

Criticism on the score of noise is also very severe, this section of the report concluding: "The excessive noisiness of almost every motor cycle on the market does great harm to the movement and prevents the utilitarian value of the machines being properly appreciated by the public at large."

The final examination disclosed that insufficient attention is given, as a rule, to the retention of oil in the crank-case and transmission sets, though under this heading, the Indian, with three British makes, again receives favorable comment.

There is also much room for improvement, the judges consider, in the lubrication of small parts, such as the links of spring forks, and, in place of the oil-holes so generally adopted, screw-down greasers are recommended. The "extremely inartistic appearance" of the sidecar outfit is caustically referred to and also the methods of shaping and fitting the tubular connections between sidecar and machine.

The judges in their summing up express the opinion that more attention should be given to the enclosed machine with a well-balanced multi (two or four) cylinder engine and of medium weight. They eulogise the per-

formances of the small machines with tiny two-stroke engines but criticize their weight.

REPORT CRITICIZED

The judges' reference to an "enclosed machine" doubtless bears upon the need for a more workmanlike system of construction than that used without exception at present. They seemingly have in mind a pressed steel framework, with the engine, transmission, etc., enclosed between the frame sides, protected from mud and dust, and placed where oil cannot be thrown off on to the rider. A machine of this type was recently described in a British motor cycle journal, but it has not been put in production and there are no signs of its being adopted as the standard type of any manufacturing concern.

There is much room for improvement in motor cycle design, but while the public will greedily absorb the outputs of every concern with a reputation and is always demanding more at whatever price may be asked, there is little inducement for established concerns to strike out on new lines and produce something more than a glorified pedal cycle with engine, transmission, tanks, etc., festooned on the tubular framework with no regard to general appearance, cleanliness or workmanlike design.

Makers and potential purchasers both criticize the Report because no intimation is given by the judges as to the cause of the deduction of marks from each machine's record during the final examination. These trials are held ostensibly not only to ascertain the comparative merits of the competing machines, but also to assist the designers and makers by revealing weaknesses or defects which can be eliminated in subsequent models. But if each maker is not told in what respects his machine is deficient after such strenuous use, he lacks the official suggestions that should be forthcoming to assist his endeavor to "improve the breed."

THE CONSTRUCTION OF GRAPHICAL CHARTS, by Prof. John B. Peddle. Edition published by the McGraw-Hill Book Co., New York. 158 6x9 in. pages; price, \$2.00

Prof. Peddle's work on the construction of charts for use in engineering work, which was originally published in 1910, has become well known and generally appreciated. The first chapter is devoted to rectangular co-ordinate charts and in the second chapter the alignment chart is taken up. Both of these forms of charts are well known, as examples of them have frequently appeared in the periodical press in late years. The book, however, also deals with a number of other forms of charts, namely, hexagonal index charts, proportional charts and stereographic charts. The principles underlying the different forms of charts are fully explained, and numerous illustrations of each are given. The equations charted are all relatively simple. A chapter on the use of Determinants (in the construction of alignment charts) has been added in the new edition. This is a branch of mathematics with which comparatively few engineers are familiar, but the author points out that only a slight knowledge of determinants is necessary and the fundamentals which the student must know are supplied in the book.

The Cameron Air Cooled in a “Comeback”

Nearly every one will remember E. S. Cameron's car of former years. Well, here it is again, with a 6-cylinder engine of 183 cu. in. displacement, which is the popular figure just now. The method of operating the valves is different, as instead of usual surface cams, use is made of groove cams which are mounted on a crankshaft in the bottom of the crank case. There will be two models of cars and a one ton truck

An old American make of passenger car is to be re-cooled machine which is to be made in both a revived in the new Cameron, a six-cylinder air-roadster and a touring car model. The designer is E. S. Cameron, who manufactured air-cooled cars in New England for 15 years.

Several drawings relating to the car which it is proposed to build are shown here. Lightness has been aimed at throughout in the design, and aluminum will be used wherever it is practical. It is estimated that the weight of the roadster will approximate 1600 lb. and that of the touring car 1900 lb.

The six-cylinder engine, of which two sectional views are shown, has a bore of 2 15-16 in. and a stroke of 4 1/2 in. This gives the engine a piston displacement of exactly 183 cu. in., and therefore brings it within the new racing limit. Each cylinder is cast separately, with an integral cylinder head, the cylinder barrel being cast with circumferential cooling flanges, and the head with flanges in the fore and aft direction. The valves are located in a valve pocket formed on the cylinder head, and are arranged coaxially, with their stems horizontal; they have their seat in removable valve cages which are cast with cooling pins. The valve springs, which are of the volute type, bear against the

ends of the cooling flanges of the valve cages which should protect them against overheating.

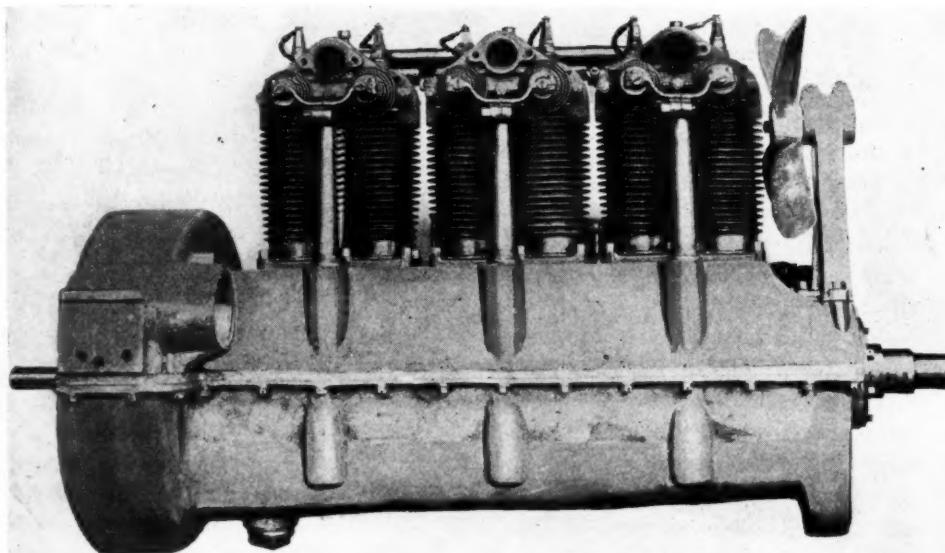
One of the most interesting features of design from a mechanical standpoint is the method of operating the valves. Instead of the usual surface cams, use is made of groove cams which are mounted on a camshaft located

in the bottom of the crankcase directly below the crankshaft. This camshaft is driven from the crankshaft through a pair of spur gears, giving the usual 2 to 1 reduction. On each side of the engine, there are three vertical shafts or rods, which extend up through guides or housings bolted to the top of the crankcase.

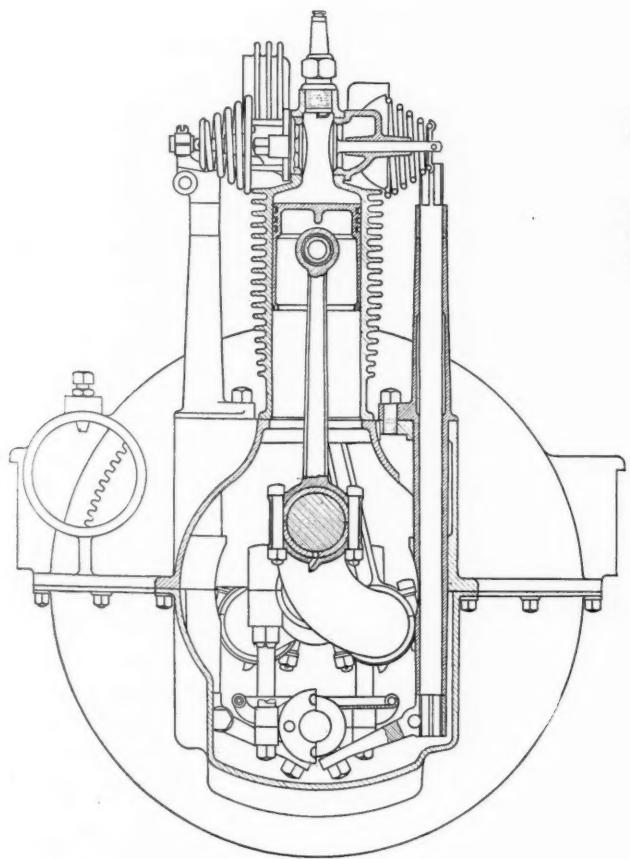
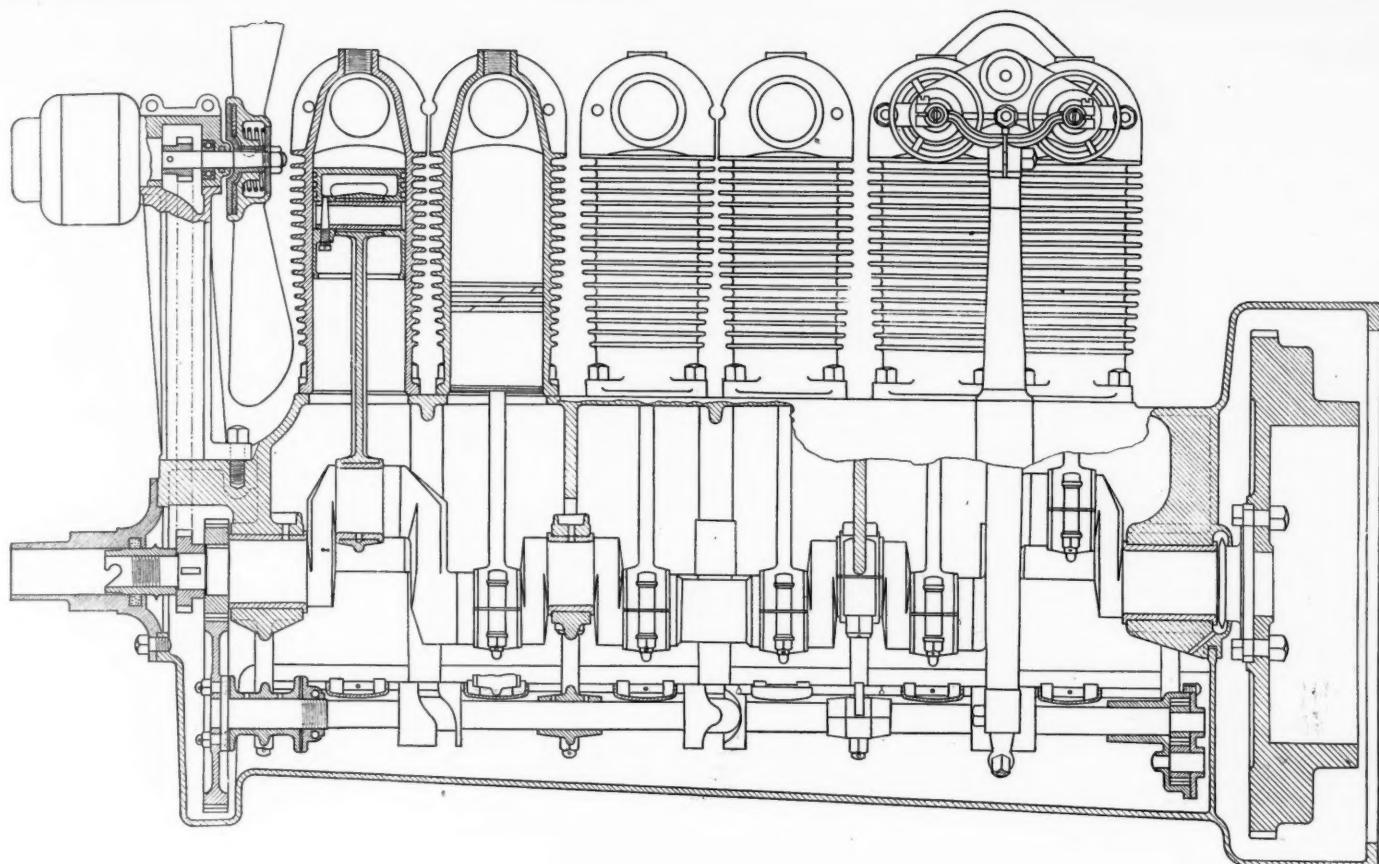
These shafts at their lower

ends carry a lever arm which at its end is provided with a cam follower extending into the cam groove. At the upper end, the shafts carry a double armed lever, each shaft being used to operate two valves. Valves of the same kind in two adjacent cylinders are thus operated through the same vertical rocker shaft, alternately. This makes a very compact valve mechanism, as well as one which is quite accessible for adjustment. The supports of the rocker shafts are braced by bolts which connect opposite ones together.

From sectional views it will be seen that the pistons, connecting rods and crankshaft are of conventional de-

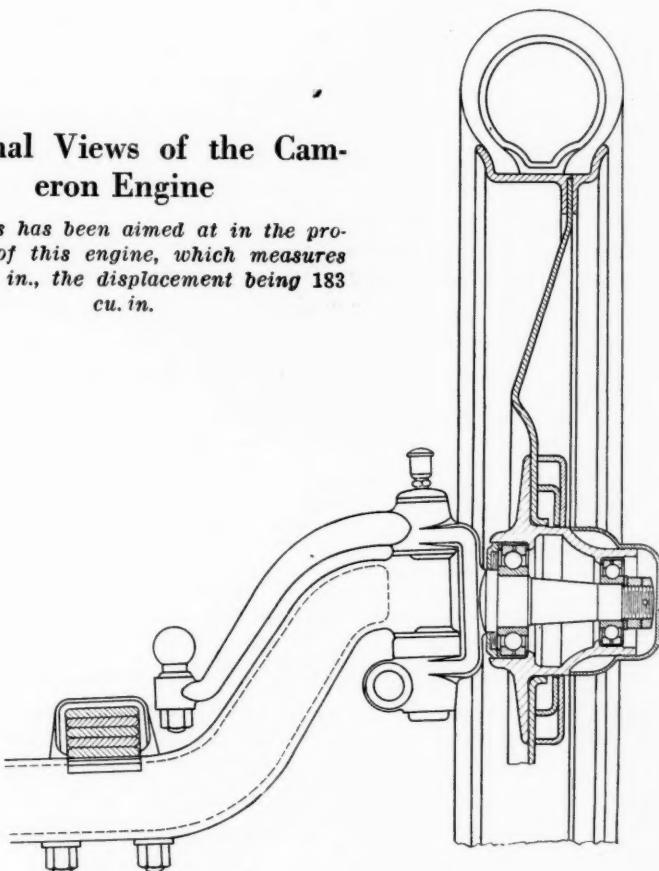


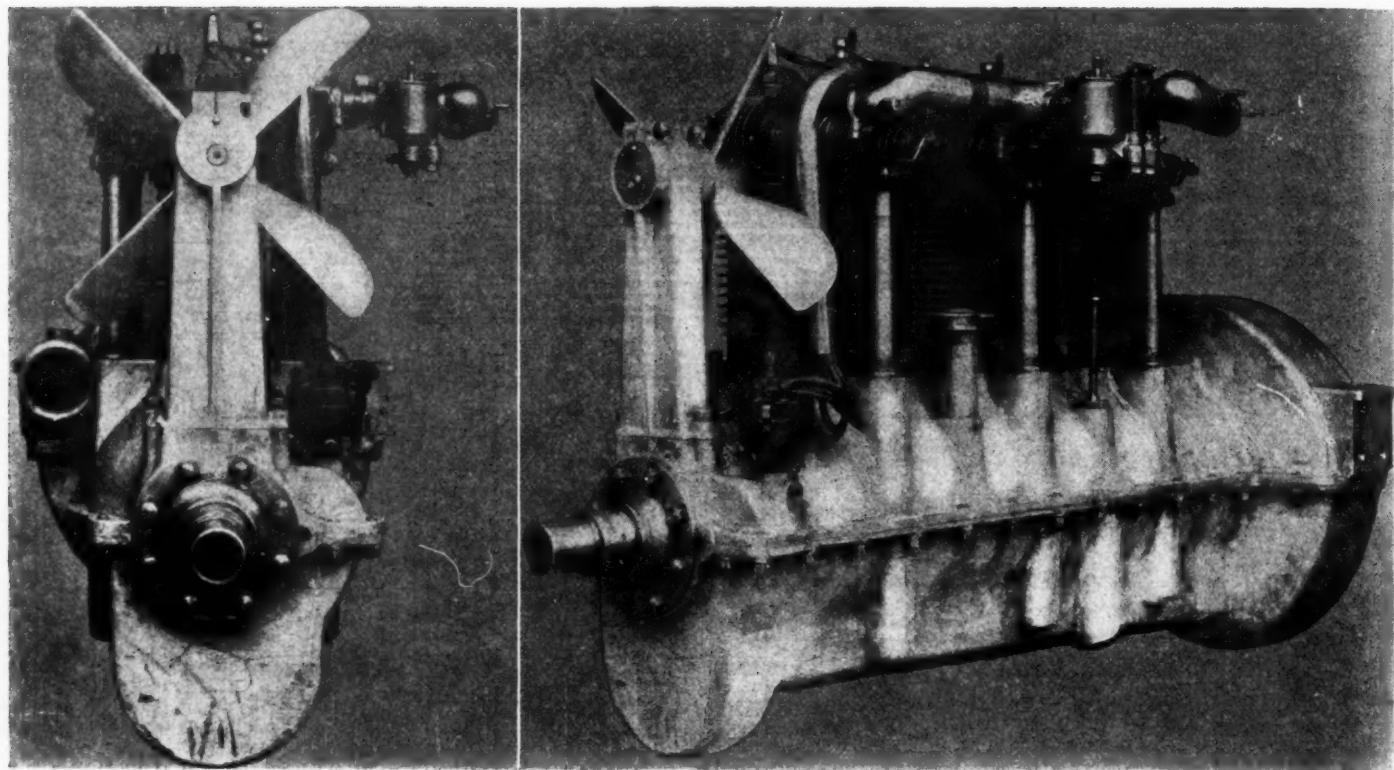
The engine that will go into the Cameron car, to be rebuilt after a lapse of years



Sectional Views of the Cameron Engine

Lightness has been aimed at in the production of this engine, which measures $2\frac{1}{8} \times 4\frac{1}{2}$ in., the displacement being 183 cu. in.





Front and left views of the Cameron engine

sign. The crankshaft is supported in four main bearings from the upper half of the crankcase. To ensure effective cooling of the cylinders, a large sized propeller type fan is mounted at the forward end of the engine, and driven from the crankshaft through a roller chain. A friction clutch is inserted in the hub of the fan in order to reduce the stresses while the engine is rapidly accelerating or decelerating. The electric generator will be mounted on the fan bracket and driven from the fan shaft.

Lubrication is by circulating splash and a gear pump for circulating the oil is mounted on the rear end of the camshaft, in the bottom of the crankcase. The engine is designed for unit power plant construction, and provision is made to mount an electric starter on the flywheel housing.

Ignition is by the Connecticut high tension system, and a Bijur or similar starting and lighting system will be fitted. The 3-speed and reverse transmission is mounted as a unit on the engine and a Borg & Beck 3-plate clutch is used.

AXLE CONSTRUCTION

The rear construction will be manufactured in the Cameron shops, and will comprise a pressed steel axle housing, spiral bevel gear drive, and a rigid torque tube with a single universal joint, the torque tube being forked at its forward end, and swivel-connected to the car frame. Ball bearings will be fitted throughout the rear axle. The front axle also will be of special design, employing a pressed steel central portion with drop forged axle ends, to which the pressed steel member is riveted.

As shown by the assembly view of the car, steel disk wheels will be fitted, and these will be equipped with 34x4 in. cord tires. The spring equipment consists of semi-elliptic springs all around, the front springs being 37 in. long and the rear springs 48 in.

The high speed roadster has a wheelbase of 108 in., and the five passenger touring car a wheelbase of 118 in.

TO MAKE SMALL TRUCK

In addition to the above two passenger car models, there will be a 1-ton truck, known as Model D. This will be fitted with the same air-cooled engine as the passenger cars, the same clutch and transmission, but will have a Torbensen internal gear type rear axle. This truck will have a wheelbase of 136 in., allowing of a free space for the body 104 in. in length. The front axle for this truck model will be drop forged. Tire equipment will be 35x5 pneumatic cord, and the truck will be fitted with a cab with built-in windshield. Fitted with an open body with 12 in. sides and 6 in. flareboards, having inside measurements of 52x110 in. The equipment furnished includes two combination headlights, one tail light, jack, pump and full kit of tools.

The Cameron concern has been reorganized as the Cameron Corp. E. S. Cameron is president, S. S. Young, vice-president; V. C. Morris, secretary and treasurer, and H. W. Doherty, A. L. Deuschel and A. C. White, directors. The company has been incorporated with a capital stock of \$3,000,000.

The car will be priced at \$2000, the truck at \$2400. f. o. b., New Haven.

Bearing Loads on Gear Transmissions

This informative article is one of the American Gear Manufacturers' Association meeting series. This is the story. Mr. Heldt attended that meeting, as he has all previous meetings, and this problem was suggested to him by one of the members with the suggestion that he work it out. Here is the solution and it will prove of interest to all who study gears.

By P. M. Heldt.

FROM the time the stub tooth or 20 degree pressure angle tooth was introduced in gear cutting practice, the objection has been raised against it that it increases the bearing load. Naturally every designer desires to minimize his bearing loads, because heavy bearing loads not only call for larger bearings, thus occasioning greater cost of construction, but they also involve a continued increased loss in power, as with a given type of bearing the friction co-efficient is practically constant and the frictional loss is then directly proportional to the bearing load.

It is true that for a given horse power transmitted at a given speed the bearing load is greater with stub tooth gearing than with the regular 15 deg. involute gearing, and there would be no occasion for reopening this subject for discussion were it not for the fact that there is an apparently widespread misunderstanding as to how the bearing loads are calculated. The increase in the total bearing load due to a change from 15 deg. to 20 deg. pressure angle is very slight and practically negligible, but by considering only the radical component of the tooth pressure, the pressure which tends to force apart the two shafts which are placed in driving relation by the gearing—which some designers seem to consider the essential factor—the impression is conveyed that there is a relatively large increase in bearing load when stub teeth are adopted.

with the pressure angles in question the radical component of the bearing load increases relatively rapidly with an increase in pressure angle, the increase in the total load, which is the determining factor as regards bearing sizes required and bearing losses incurred, is quite slow.

The transmission of a certain horse power at a certain speed involves a certain pitch circle tangential force. It is this tangential force which should serve as a basis of comparison. If the tangential forces are the same and the pitch line velocities as well, then the horse powers transmitted are the same. The tangential force is a wholly imaginary quantity, but can readily be calculated when the horse power transmitted, the speed of revolution of the driving gear and its pitch diameter are known.

The relation between the tooth pressure and the tangential force is shown diagrammatically in the figure herewith. The line AB represents the tooth pressure both in direction and magnitude. This pressure, of course, is perpendicular to the tooth flank and therefore makes an angle with the tangent to the pitch circle equal to the pressure angle.

This tooth pressure, which is a force that actually exists, has two components, one, AC, tangential to the pitch circle and the other, BC, perpendicular thereto. The former is the useful pressure (the tangential force), while the component BC is a pressure which tends to force the two shafts apart. Calling the pressure angle θ the tangential force F and the tooth pressure P , we see from the diagram that

$$P \cos \theta = F$$

$$\text{and } \theta P = \frac{F}{\cos \theta} = F \sec \theta$$

It will also be seen that

$$\frac{BC}{AC} = \tan \theta$$

Hence

$$BC = AC \tan \theta = F \tan \theta$$

(Continued on Page 1174)

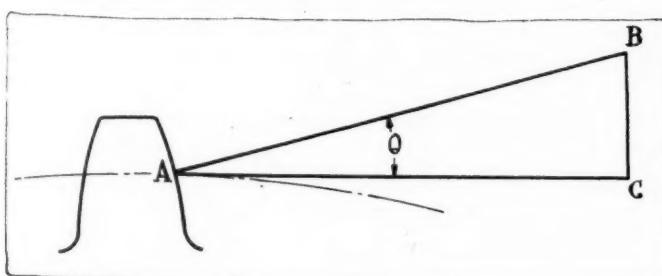


Diagram of tooth pressure tangential force and radial force

It can readily be shown that the radical component is only a fraction of the total bearing load and that while

Light Powered Motorcycle Has Vee Type Engine

The first experiment of the Hendee Company to reduce the power plant in their machines was with horizontal type engines but many advantages were found in the Vee type. The design of this new power plant is interesting, and so are the results—for it is rated at only 5 h. p. but in dynamometer tests has developed 11 h. p.

By P. M. Heldt

DURING the past two years American motorcycle manufacturers, in spite of the war, have done a considerable amount of development work. Much of this has been done on two-cylinder opposed engines, a type which had met with favor in England. Aside from the success of the British Douglas Company with its two-cylinder opposed machines, it was probably the desirability of using smaller and less powerful engines that induced American makers to take up the horizontal type.

One of the difficulties with this engine is that of finding space for it in the motorcycle frame and this, of course, is less pronounced the smaller the engine. The outstanding advantage of the opposed type of engine is its very nice balance, but this advantage is offset in practice by a number of difficulties, including that of lubricating the two cylinders equally and the likelihood of condensation of the charge due to the long inlet pipe required.

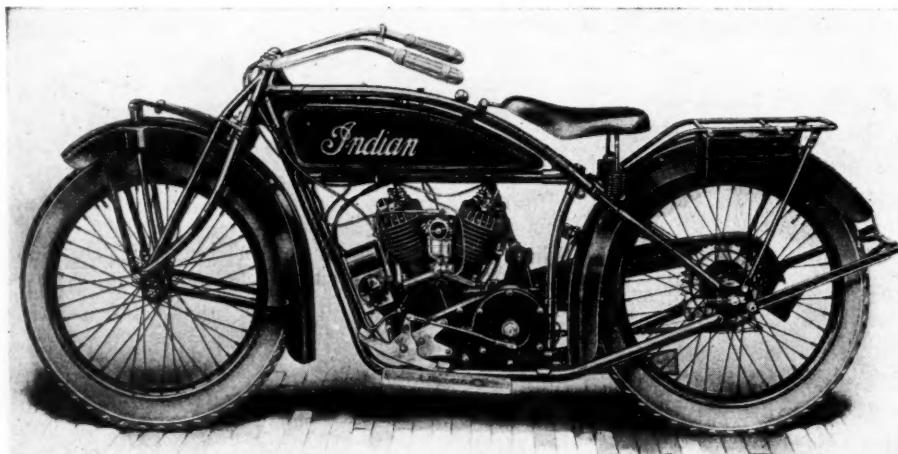
The Hendee Mfg. Co., which has been manufacturing a 61 cu. in. model of the Powerplus, saw a promising field for a motorcycle of materially less power. After experiments with two models of horizontal engines, the decision was that for light as well as for heavy motorcycles, the Vee type engine possesses a balance of advantages. The company's line for 1920 has been announced and it includes, besides the Powerplus Type N-20 and a similar Type NE-20, which carries a complete electrical equipment, an entirely new light machine,

Type G-20, which, like the other two, is fitted with a Vee type engine. Contrary to the Type N, which is built mainly as a side car machine, the Type G is intended for service as a solo machine only. It is also referred to as the Indian Scout to emphasize its solo character.

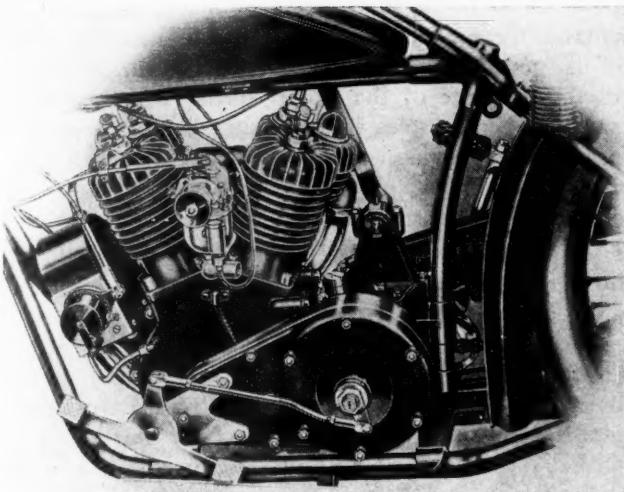
The new engine has $2\frac{3}{4} \times 3\frac{1}{16}$ in. cylinders, giving a piston displacement of 36.38 cu. in. In general the engine is on the same type as the Powerplus, the two cylinders being arranged at an angle of 42 deg. and provided with side-by-side valves, which are operated from the camshaft by direct thrust.

The cylinders are cast integral with the cylinder heads, and are provided with circumferential flanges for air cooling. The valves have a clear diameter of $1\frac{1}{4}$ in. and a lift of $\frac{1}{4}$ in. The openings in the cylinder heads through which the valves are inserted are closed by screw plugs, and into the plugs over the inlet valves the spark plugs are screwed.

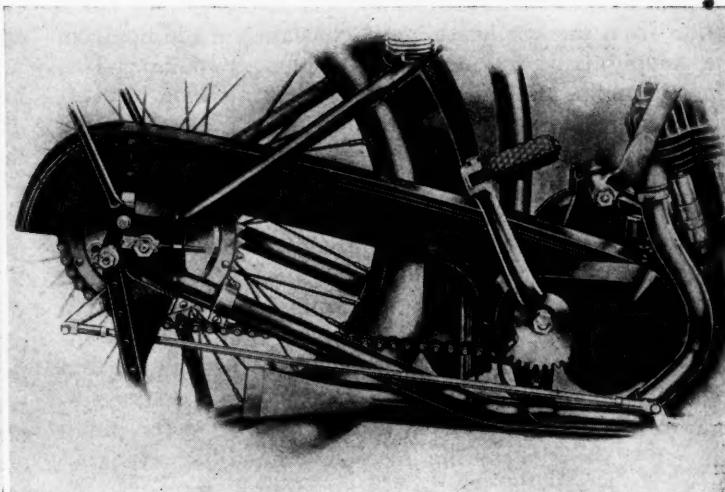
Pistons are of trunk design and made of cast iron. They carry 2 compression rings at the upper end, and are relieved over the ends of the piston pins. The piston pins, which are of the usual hollow, case-hardened construction, bear directly on the cast iron of the piston bosses. Lubrication of these bearings is assured by drilling diagonal holes through ribs which connect the cylinder wall and the piston boss, from the oil groove just beneath the lower piston ring groove. 1 section



Left side, showing primary drive, rocker pedal for clutch control, double tube frame



Power plant, clutch, rocker pedal, primary drive and magneto



Final drive, kick starter, tubular muffler, brake, etc.

drop forged connecting rods are fitted, and are clamped to the piston pins by means of bolts whose axis lies at right angles to the connecting rod shank, the bolt passing slightly beneath the surface of the pin.

As is usual in motorcycle engine construction, the crankshaft is built up, the two flywheels being enclosed within the crankchamber. This makes it convenient to use roller bearings on the crankpin.

One of the connecting rods is forked, but both rods bear directly on the crankpin, each being provided with a double set of rollers. All rollers are cylindrical, and are held in retainers.

The crankpin and main journals are fitted into the flywheels by means of a taper and nut. The main journals are also supported on roller bearings, there being two sets of rollers on each. The bearing on the driving side is considerably longer than that on the opposite or timing gear side, and the two sets of rollers on the driving side are separated by a spacer of appropriate length. The rollers run directly on the case hardened journals, while hardened bushings are inserted into the connecting rod big ends and the crankcase bearing hubs. The flywheels are $7\frac{1}{8}$ in. in diameter, and are cast with balance weights opposite the crankpin bosses.

Both sets of valves are of alloy steel in one piece. Their guides are screwed into the cylinder casting, and valves, springs and tappets, are surrounded by dustproof sleeves. The timing gears are enclosed in a housing which is cast onto the right half of the crankcase. One cam operates both the inlet and the exhaust valve on each cylinder. There are two camshafts, one for each cylinder. Of these the forward one is driven directly from the pinion on the crankshaft, while the rearward one is driven through its gear meshing with the gear on the forward camshaft. From the latter gear is also driven the magneto which is located forward of the engine, two intermediate pinions being used for the purpose. To make it possible to operate two valves from a single cam, use is made of double arm rocking levers, provided with two cam followers each, as well as with two heels

engaging the pushrods. These pushrods are provided with guides set into bosses cast on the crankcase. The tappets are provided with the usual adjusting screw check and locknut, and the upper end of the tappet has a hexagon head to permit of holding it from turning while making the clearance adjustment.

Provision is made in the design of the valves to prevent the upper ends of the valve springs from receiving too much heat from the valve pockets, and thus losing their temper. To this end, the flanges on the valve guides are turned with a shoulder, and a short flanged sleeve is pressed over the reduced portion against the shoulder. The upper half of the valve spring dust cover bears against the flange on this short sleeve, and the upper end of the spring bears against the flange of the dust cover, so that any heat from the valve pocket, before it can reach the spring, must pass through several joints and through metallic parts of comparatively thin section which afford little facility for heat conduction and much for radiation.

SCHEBLER CARBURETER

The intermediate pinions in the magneto drive have their shafts forged integral with them, and these rotate in bronze bushings set into the bearing hubs of the aluminum gear housing. These bronze bushings are keyed into the housing, and are blind, so as to prevent the loss of lubricant through them.

A Schebler Model H carburetor is fitted. Fuel is carried in a one-piece tank with separate compartments for gasoline and oil. The gasoline capacity is 3 gal. and the oil capacity 3 qts. The tank is mounted in the frame. There is a needle shut off valve for the gasoline. The filler cap has an inside diameter of $1\frac{1}{2}$ in. and is provided with a priming syringe. Ignition is by an Aero magneto, which is driven from the crankshaft as already explained. The spark plugs fitted have a metric thread, which is the standard for motorcycle and aeronautic purposes.

The crankcase consists of two aluminum castings, being split in a plane perpendicular to the crankshaft axis.

Engine lubrication is entirely by splash, the loss of lubrication from the crankcase being constantly made up from the supply tank by means of a plunger pump. This plunger pump, also known as the Indian mechanical oiler, is driven from the timing gear train. On the oil tank, which, as already pointed out, is combined with the gasoline tank, there is a hand oil pump which is provided with a special latch on its handle to prevent unauthorized use. One of the cam gears through a Hookham joint drives a small worm, meshing with a worm wheel, worm and wheel being mounted in bearings in the aluminum cover plate. The inboard journal of the worm is enlarged to a disk of a larger diameter than the worm wheel itself, and is provided with a crankpin adapted to slide in a transverse slot on a block secured to the pump plunger. The slot in the block in which the crankpin moves is horizontal, and this horizontal freedom, together with the up and down freedom of the pump plunger, permits of the rotation of the crankpin.

THE LUBRICATION SYSTEM

Oil enters the pump barrel through side ports from the tank above the pump and as these ports are located near the upper end of the stroke, no inlet valve is required. There are, however, two delivery valves, arranged in series, so that if one should stick or fail through some other cause, the pump would still be operative. The pump delivers oil into the crankcase, and all the interior parts are lubricated by splash. The crankcase is provided with a relief valve, which opens whenever the pressure within the case is above atmosphere, allowing the pressure to equalize itself. This valve places the crankchamber in communication with the timing gear casing, and through it oil finds its way from the crankchamber to the timing gear compartment. Thus the lubrication of the timing gears is provided for. All excess oil is expelled through the port in the crankcase, and the breather pipe to the ground.

Unit power plant construction is employed, the engine being combined with the primary drive and the transmission into a single unit. The primary drive consists of a helical pinion on the crankshaft, an idler mounted on roller bearings, and a driven gear, which is combined with the friction clutch. The gears of this primary drive run in a special oil bath, and are enclosed in an aluminum casing which is secured to flanges on the crankcase and on the transmission case. The gears of this primary drive have helical teeth of very fine pitch, so as to minimize the noise of operation. By means of this primary gear a speed reduction of $2\frac{1}{2}$ to 1 is obtained.

The friction clutch is of the multiple disc type and operates in oil. It comprises 13 metal discs, which are held in frictional engagement by means of a number of coil springs arranged in a circle, and pressing directly against the end disc. The outer discs are the driving, and the inner discs the driven members. The outer discs are driven through studs riveted into the web of the driven gear and the inner discs are threaded over teeth on a drum keyed and bolted to the spliced shaft of the transmission. The clutch is disengaged by means of a rocker pedal located on the left footboard. This connects to a short lever secured to the end of a screw shaft, arranged concentric with the splined shaft of the transmis-

sion, the screw being surrounded by a nut which is held by suitable means from rotation, so that rotation of the worm is productive of an endwise motion, which removes the pressure of the clutch spring from the clutch disks. The clutch releasing pressure is transmitted to the presser disk through the intermediary of a ball thrust bearing. Lubrication of the clutch is effected by the same means which serve for lubrication of the primary drive, as both parts are located in the same housing.

Three forward speeds are provided by the transmission, the gear being operated on the progressive principle. The main shaft of the transmission is carried in ball bearings, while bronze bushings are used on the countershaft. The third speed is a direct drive, and is obtained by means of a jaw clutch. Gear shifting is accomplished by means of a lever mounted on a pedestal integral with the cover plate of the transmission casing.

The final drive is by chain, and is located on the right-hand side. A Duckworth $\frac{3}{8} \times \frac{5}{8}$ in. roller chain is used, and is protected by a guard.

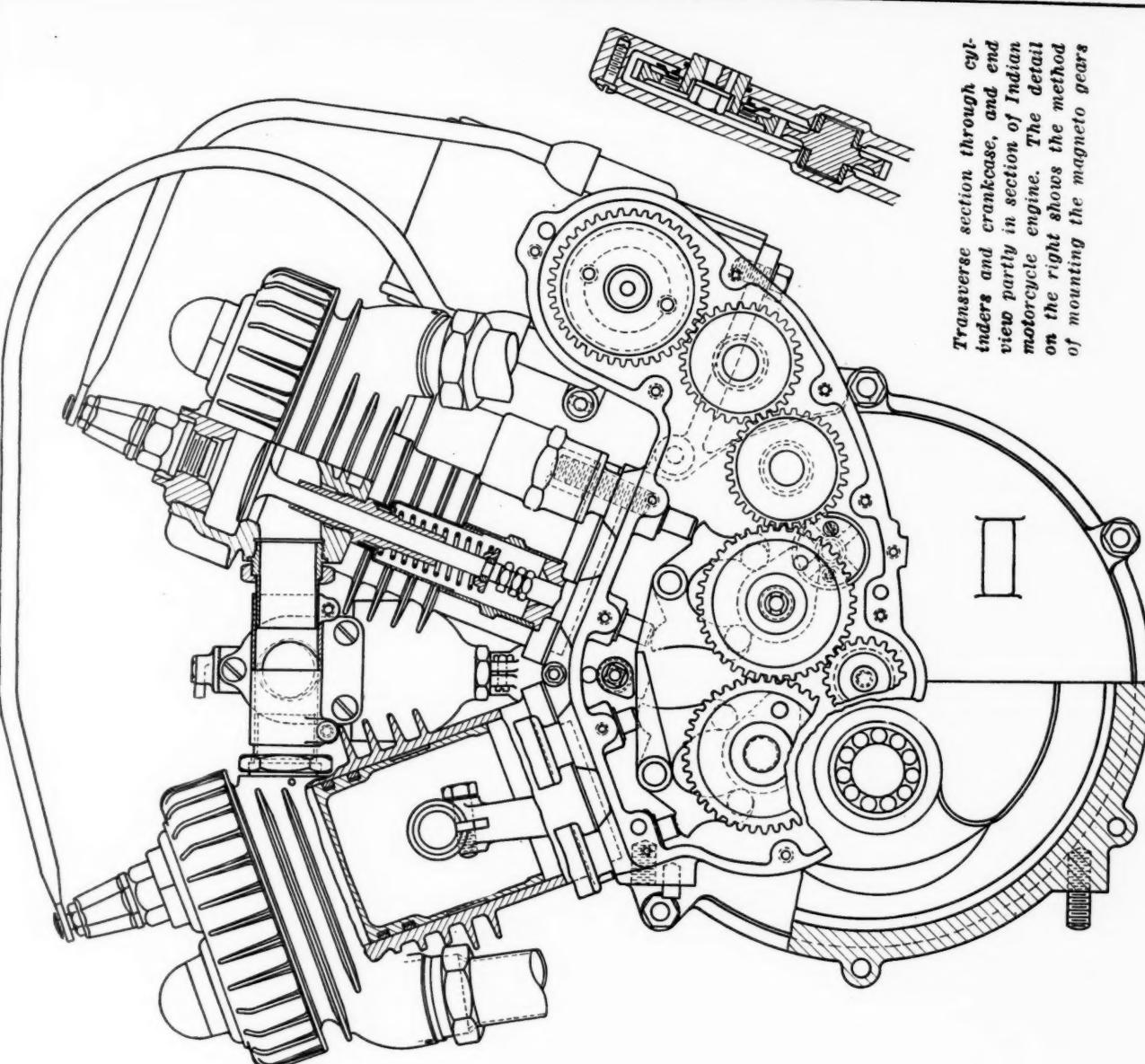
Combined with the transmission is a kick starter of the segment and pinion type. The segment and its lever are pivoted on a stud secured into the transmission housing, and a coiled spring as arranged over the hub of the segment to hold the latter when not in use in such a position that it is entirely out of mesh with the pinion. The pinion, which is mounted on the protruding end of the transmission mainshaft, is free on that shaft, but is provided with clutch jaws which are adapted to engage corresponding jaws on a clutch member secured on the squared end of the shaft. A heavy coiled spring, surrounding the hub of the pinion, and extending between the nut holding the driving sprocket and the web of the starter pinion, forces the latter into engagement with the clutch member on the transmission shaft. The starter pedal is moved back to give the initial impulse to the motor, and is returned to the inoperative position by the spring, being held ready for use by a spring stop.

TRANSMISSION

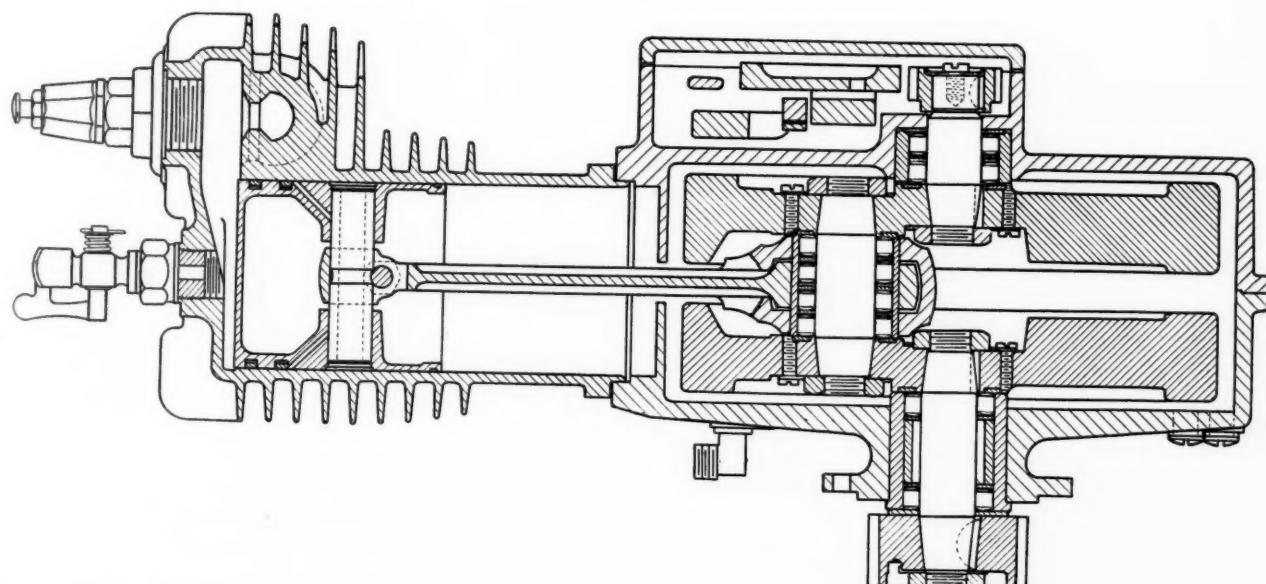
The transmission is bolted to lugs on the rear of the crankcase, and to the primary drive casing by means of flanges. There is one lug on each side of the crankcase, and one lug on the rear of the transmission casing, for giving the power unit a 3 point support. Each of the three members of the unit power plant has its own oiling system, there being an oil bath in each of the various housings.

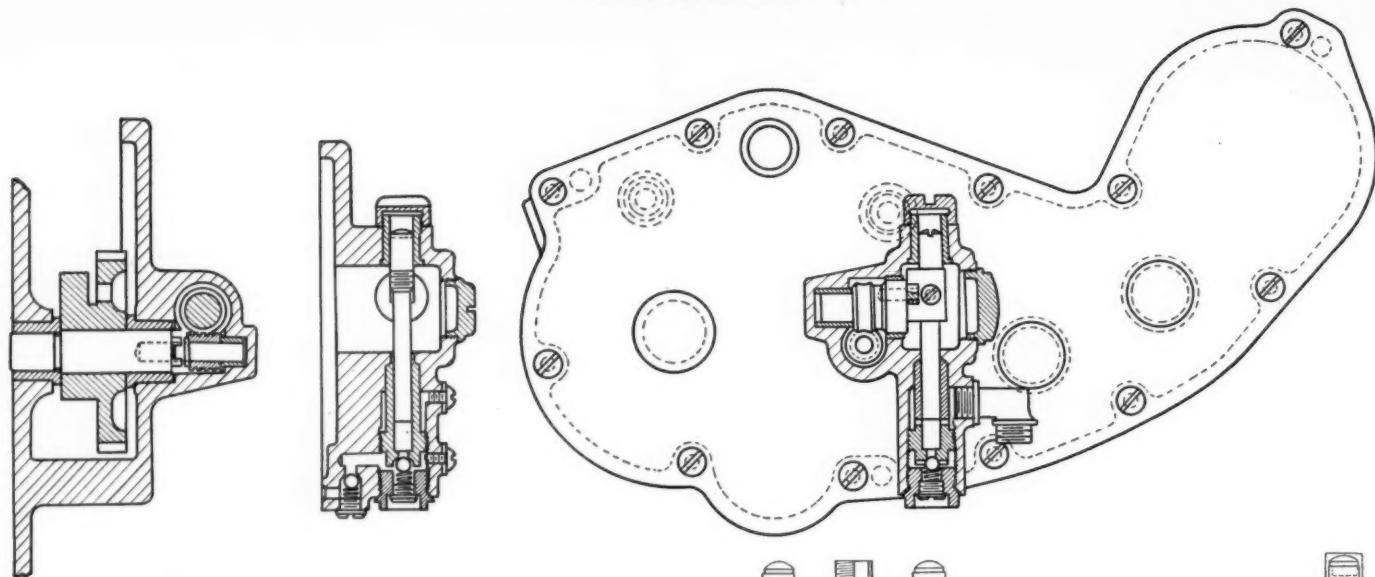
A double tube type of frame is used. Alloy steel tubes lead from the lower part of the drop-forged steering head, receding from each other, and toward the end turning until they extend horizontally, forming a cradle to which the unit power is secured at 3 points. The lower tubes run parallel to the slider forks. The upper frame member, or top tube, slopes downward to give a low saddle position ($2\frac{1}{2}$ in. from the ground) and meets the slider forks at the rear.

The front fork is of the Indian leaf spring type, comprising a tubular frame made up of fork sides with brace tubes. Spring butts are bolted to the double crown. The drop-forged bell cranks are fitted with removable bushings, and screw-down lubricators. To the rear end



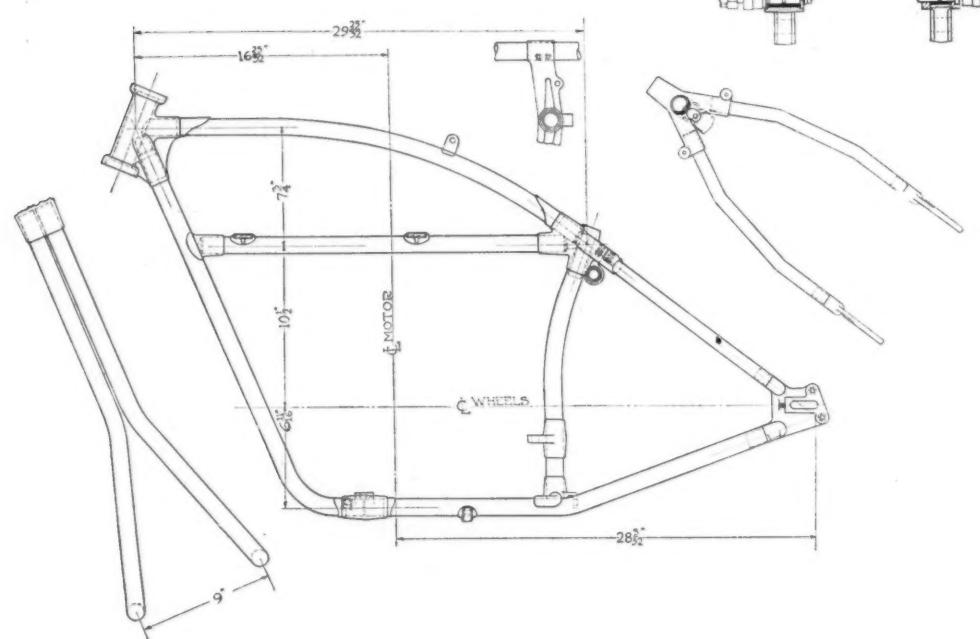
Transverse section through cylinders and crankcase, and end view partly in section of Indian motorcycle engine. The detail on the right shows the method of mounting the magneto gears



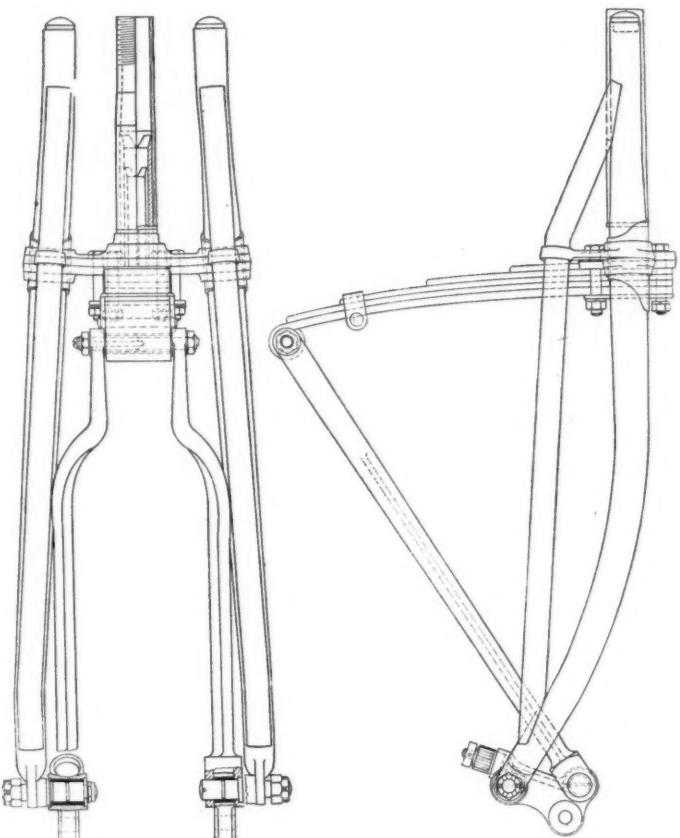


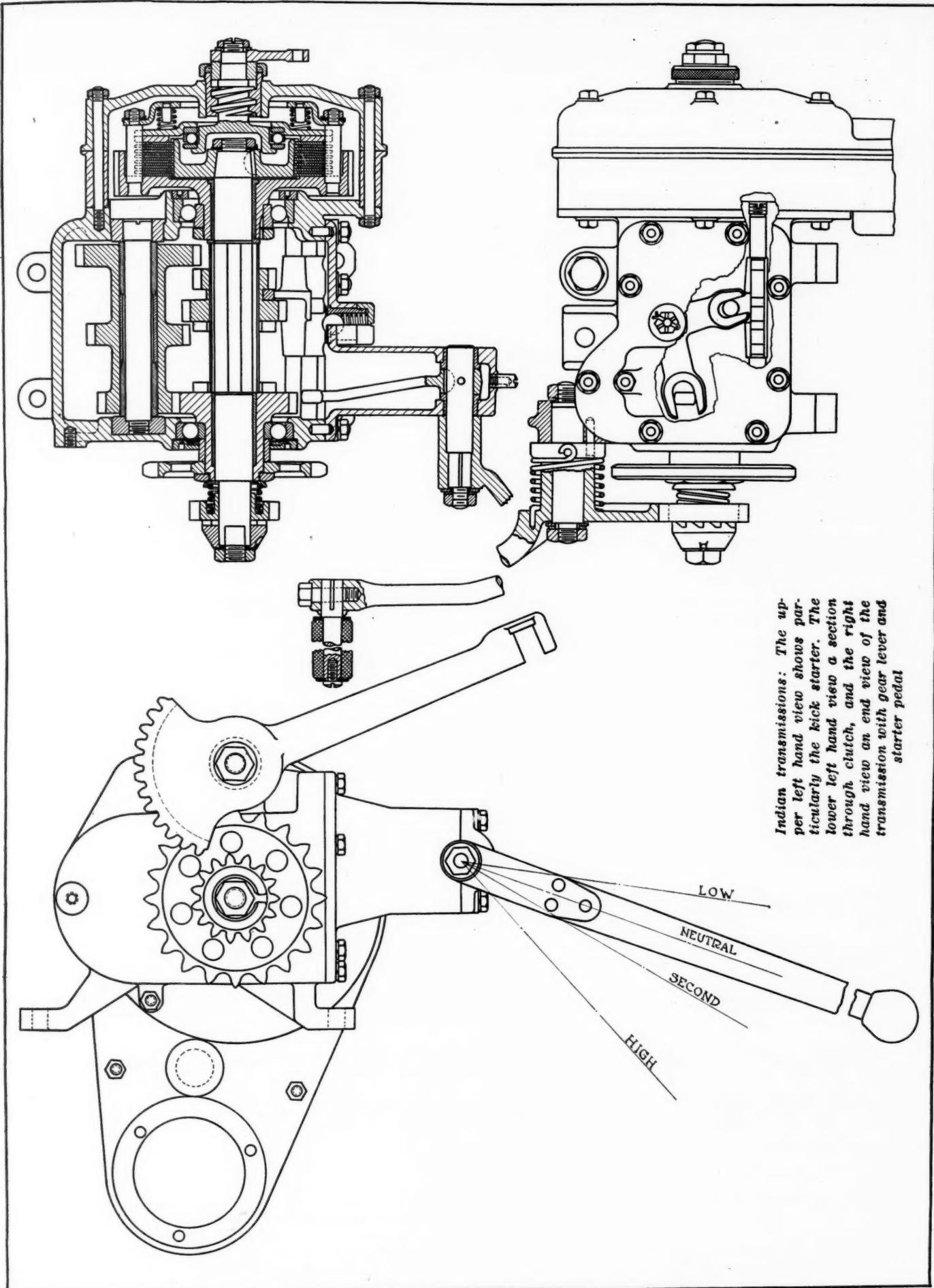
Oil pump on gear case cover and its drive

of the bell crank the spring ends are connected by tubular members. The handle bars are integral with the fork connecting bracket. There are really three points of attachment to the fork, one at each fork side end, and one at the end of the stem. Spark and throttle control are effected by means of wire controls operated by a twist of the wrist. Where the control casings emerge from the bars, they are protected with leather sheaths. To facilitate starting, an exhaust valve lifter is fitted, which is actuated from the right handle bar by means of a Bowden wire mechanism, a lifter arm being fitted on the timing gear casing. The brake is of the internal expanding type, and is operated by means of a throttle on the right footboard. Brake segments faced with asbestos fabric are expanded against the inside of a pressed steel brake drum.



Above: Two views of front fork with spring.
On left: Side of frame and details





Indian transmissions: The upper left hand view shows particularly the kick starter. The lower left hand view a section through clutch, and the right hand view an end view of the transmission with gear lever and starter pedal

Twenty-six by 3 in. tires are fitted on CC rims. The hubs, spokes and rims are enameled black. Both the front and rear axles are of the knock-out type. The regular tire equipment is Goodyear with non-skid tread. The machine has a wheelbase of 54 in.

The hinged type of rear stand provided is held up by a spring latch when not in use. A Persons saddle with special suspension is fitted. One piece pressed steel mud-guards are used, and are provided with flat braces. These mud guards have a double anchorage to the frame, and the luggage carrier acts as an extra brace for the guard. The luggage carrier is of the Indian tubular type, with a metal tool box mounted on the side. The equip-

ment includes a full set of tools and tire repair kit in a metal tool box, the box being provided with a snap lock and key; it also includes a frame pump and clip. The finish of this model is in the familiar Indian red with double gold striping. The price is \$295.00, f.o.b. factory.

While the Indian Scout is rated at only 5 h.p., its engine is said to develop 11 h.p. on the dynamometer. Speeds of 55 to 60 mp.h. have been obtained on the road, and the gasoline consumption is said to average 1 gal. per 60-65 miles, while the oil consumption averages about 1 qt. per 200 miles. The weight of the machine is 256 lb.

Bearing Loads on Gear Transmissions

(Continued from Page 1167)

In other words, the tooth pressure is equal to the cential force times the secant of the pressure angle, whereas the radial pressure tending to force the shafts apart is equal to the tangential force multiplied by the tangent of the pressure angle.

Now, the load on the bearings is not equal to the radical force, as is often erroneously supposed, but is equal to the tooth pressure. The bearing load is the reaction to the action represented by the tooth pressure and is equal and opposite to it in direction.

The above considerations will enable us to readily compare 15 deg. involute and 20 deg. stub teeth as regards the bearing loads they produce. The secant of 15 deg. is 1.0353 and the secant of 20 deg. is 1.0642. Hence the bearing load with a 20 deg. pressure angle is greater by

$$\frac{(1.0642 - 1.0353) \times 100}{1.0353} = 2.8 \text{ per cent.}$$

than the bearing load with a 15 deg. pressure angle.

This light increase is practically negligible.

On the other hand the radial pressure tending to force the two shafts apart increases much faster than this.

$$\tan 15 \text{ deg.} = 0.268$$

$$\tan 20 \text{ deg.} = 0.364$$

$$\text{increase} = \frac{(0.364 - 0.268) \times 100}{0.268} = 36 \text{ per cent}$$

However, even with the 20 deg. tooth the radial pressure, which constitutes one of the components of the bearing load, is only about 34 per cent of the tooth pressure or full bearing load. It does not make any difference what the direction of the load on the bearings is — whether it is chiefly in the plane of the two shafts connected by the gearing or whether it is not: the thing that matters is the total bearing load, and this is hardly affected at all by an increase in pressure angle from 15 to 20 deg.

Thin Plywood

THIN plywood, made of two or three tissue-like sheets of veneer, is suggested by the Forest Products Laboratory, Madison, Wis., as a material apparently having many possible applications. The new product is extremely light, strong, and flexible. It shrinks and swells very little with changes of moisture, and will withstand long continued soaking in hot or cold water. It can readily be made fire-resistant. Cloth, paper, or wire screen may be combined with the veneer to increase toughness and resistance to tearing, and the plies may be arranged with their grains running at any angle, to give the plywood more strength in a particular direction.

A method of manufacturing extremely thin plywood has been worked out by the laboratory and will be explained in detail to anyone upon request.

On account of its fragility, thin veneer is difficult to glue with wet glue by the ordinary methods. It cannot be run through a glue spreader without first being reinforced. If the glue is spread by hand, the veneer absorbs water and

swells excessively, producing wrinkles and poor joints. Large sheets of thin veneer which are wet and heavy with glue are almost impossible to handle without tearing.

The method of gluing developed by the laboratory avoids all such difficulties. The glue used is of the blood-albumin type. Instead of being spread directly on the veneer, it is spread on sheets of tissue paper. After the coated tissue is dry it is inserted between the sheets of veneer, and the joint is made in a hot press. The practicality of this process has been demonstrated by the manufacture of several thousand feet of thin plywood from 1/120-inch veneer.

SIR GEORGE PAISH, editor of the London Statist, writes in the London Globe appealing urgently for American commercial and financial co-operation with Europe. It is becoming evident, he says, that unless the entire problem is soon dealt with in all its aspects, a complete breakdown of credit, of exchange, of commerce and of trade must occur in the not distant future.

The Future of Automobile Sales in Sweden

High prices exacted for American cars, immediately after the signing of the armistice and to a certain extent continued, have had a tendency to hurt our products, says the report filed with the U. S. Department of Commerce. This report also says that one prominent manufacturer in Sweden believes his further competition will come from America and Germany

THE great wave of prosperity sweeping over Sweden has greatly stimulated the demand for automobiles and motorcycles, according to reports received by the Bureau of Foreign and Domestic Commerce, of the Department of Commerce. The present demand for automobiles is about 30 per cent greater than that prevailing in 1914. The Swedish automobile buyer purchases his car with the expectation of using it for a period of years and consequently demands a product that is exceedingly durable.

American automobiles enjoy considerable popularity, but meet with the complaint that they do not stand up as well as those of European manufacture. The high freight rates also increase the difficulty of marketing the American products in Sweden. Motorcycle sales have increased in like proportion within the last few years and a large number of American motorcycles are being imported.

It is estimated that there are 7,000 automotive vehicles in use in Sweden at present, of which 5,000 are passenger cars, and 2,000 motor trucks. The close of the war found 6,000 automobiles in the country, of which few could be used because of the scarcity of gasoline. With the signing of the armistice, a demand for American cars was manifested and local agents at Stockholm strained every effort to fill their orders, but were cut down on account of lack of shipping space. When shipments began to arrive, dealers sold the cars at enormous profits. For example, a Ford sold for \$2358, a Hudson at \$6432, etc. At the time of the last report Fords are \$1742 and Hudsons \$5896.

The continued high price scale, reports the Consul General at Stockholm, eventually will work harm to the American cars, due to the fact that English, French and German cars now appearing on the market, although higher-priced, sell for less in consideration of the rates of exchange which make American cars 15 to 40 per cent higher.

That Sweden can not support a large number of passenger cars is the opinion stated by the Consul General and based upon the fact that the road system outside of Stockholm comprises but 100 miles of motor highways.

The market for trucks should continue to improve as normal building and constructive operations are resumed. Farm tractors are becoming more popular and both tractors and trucks are being sold in those districts where passenger cars are of little use because of the inferior highway facilities. It is estimated by the Consul General that 500 trucks and 1000 passenger cars should be sold in Sweden within the next six months.

German automobiles are being discarded for French, English and American at the present time, most of the German trucks being quoted at from \$14,000 to \$16,000, or five times the pre-war price, and in preference the consumers are purchasing second hand cars of American, French or English manufacture and paying as high as \$6700 for them. The cheapest car in Sweden at present is the Ford, which is priced at 6000 crowns (\$1608). The Cadillac sells for \$7236.

The Malmo district of Sweden is reported to include 924 passenger automobiles and 110 trucks, by Consul H. B. Quarton at Malmo. As compared with the population, these figures are exceedingly low. Statistics show over 1,000,000 people residing in this district. More automobiles could be sold in the district, reports the Consul, because the agricultural resources of the region are rich and the buying ability of the population has not been harmed by the war.

The only Swedish factory which manufactures complete motor vehicles is the Scania-Vabis Co. This company has large steel works located at Bruzaholm, workshops at Sodertelge, and branches in Stockholm, Goteborg, Malmo, Helsingborg and Norrkoping. This company has been turning out complete cars only since November, 1918. The same company also manufactures gas and electric motors for all purposes. During the last year its automobile business has been increasing gradually. It was announced early in 1919 that the Scania-Vabis Co. had doubled its production. On July 3, 1919, another announcement appeared in the press stating that the capacity of the Scania-Vabis works had been increased fourfold. It was claimed that more orders had been received than could be filled. Recently this company has been trying to run on a more scientific basis and the automobile has become more centralized. The head office was moved from Sodertelge to Stockholm. All payments are now required to be made at Stockholm instead of at the various branches.

The Scania-Vabis works are equipped with modern hydraulic presses, hammers and machine tools. The methods of working steel, as well as other metals, are fully as modern as in other manufacturing countries. A high degree of precision and accuracy has been obtained. When certain new workshops still under construction are completed, the output will be further increased. It is planned to have a large stock of reserve parts at Sodertelge. The Scania-Vabis Company is making much of the quality of its automobiles. Newspaper writers also emphasize that this company is much better equipped than its foreign competitors to supply reserve parts upon demand. It is claimed that no foreign factory has a large stock of reserve parts in Sweden.

The Scania-Vabis Co. believes that it only has American and German competition to fear. The Swedish people have been led to believe that the export of automobiles from America will be greatly limited by the changes caused by the war. Nearly two-thirds of the automobiles now in use in this district are of American origin. The demand for American cars is extraordinarily strong, but high freights and the difficulty of obtaining tonnage are obstacles which made local competition possible. The low price and high quality of American cars are generally admitted.

The German manufacturers are meeting difficulties in obtaining raw materials. Labor and financial conditions in Germany are also unfavorable to the export of any considerable quantity of automobiles for at least a year or two after the war.

The Tensile Test in the Aluminum Factory

This is an authoritative statement on one of the newest factors in automobile design. As Mr. Gibson sets forth, the objects of the tests are (1)—To check up metal and melting practice. (2)—To check up moulding practice. (3)—To give assistance in design. In this article many of the questions that are uppermost in the minds of builders are answered

By W. A. Gibson

Doubt has been expressed lately as to the value of tension tests in a foundry, based on the fact that the same metal composition may show widely varying properties in castings and that the properties of many test bars are widely different from those of the castings made from the same heats. Such a view, however, can be due only to ignorance of the purposes for which such tests are made. These purposes may be enumerated as follows:

- 1—To check up metal and melting practice.
- 2—To check up molding practice.
- 3—To give assistance in design.

Many people believe that the main purpose of a tensile test is to help in design, when, as a matter of fact, it is of much greater importance for checking purposes, particularly for checking metal and melting practice.

In order to check up metal and melting practice, it is necessary to standardize very carefully the methods of testing and of casting, in order that results obtained in one foundry may be comparable with those obtained in another, or that tests made one day may check up with those made at another time. Variations caused by methods of testing include those due to choice of section or to methods of operating the testing machine. The American Society of Testing Materials has done much to standardize the size of section.

The standard test bar as specified by the American Society for Testing Materials, on page 248 of their 1918 Standards, consists of a 2 in. gage length, $\frac{1}{2}$ in. diameter bar, with ends to fit the testing machine. A radius of not less than $\frac{1}{8}$ in. joins the gage length to the ends, which are usually $\frac{3}{8}$ in. in diameter. This is the standard steel specimen for automobile work, and has been adopted as the standard in cast aluminum, with which this paper is mainly concerned. The diameter on a machined specimen is made 0.505 in. for the reason that this gives an area of almost exactly 0.2 sq. in., thus facilitating computations in the formula.

STRESS—LOAD AREA

The 2 in. length was arrived at because of the variations in ductility which occur as the ratio of length to diameter is varied. This is more important in ductile materials than in brittle. For example, Fig. 1 shows the way in which the ductility may be made to vary in a mild steel as the ratio of length to diameter is changed. All these tests were taken from the same bar of steel, so that the material was as nearly uniform as possible. The curve shows that the ductility may be made to vary from 42 per cent down to less than 12 per cent by changing the above ratio. As a result a ratio of 4 was adopted as the standard ratio of length to diameter of the test section. It also frequently led to the use of the per cent reduction of area in specifying the ability of a material to withstand deformation. The error is greatest in a material which is subject to a large and localized reduction of area. Since cast aluminum alloys are but very little subject to this "necking," this ratio is not as important in aluminum as in steel, but is maintained in order to follow the general practice in making ductility measurements.

All bars should have threaded ends turned in the lathe and should be tested with self-aligning adapters. The centering then should be done upon the test section and not upon the threaded ends of the bar. In other words, the thread must be concentric with the test section. In many cases it is not practicable to thread bars and the use of jaws must be resorted to. If a testing machine is in perfect alignment, the use of jaws introduces but very little error. The trouble is that it is never certain just when a machine is out of alignment and the error caused by the use of jaws is therefore a variable one, varying from zero to very high values in some cases. In the majority of cases it will be close to 5 per cent. Frequently such an error is not objectionable, but any person using the data should always have this element of uncertainty in mind. For a close comparison threaded ends must be used.

Flat test bars are even more objectionable than the round

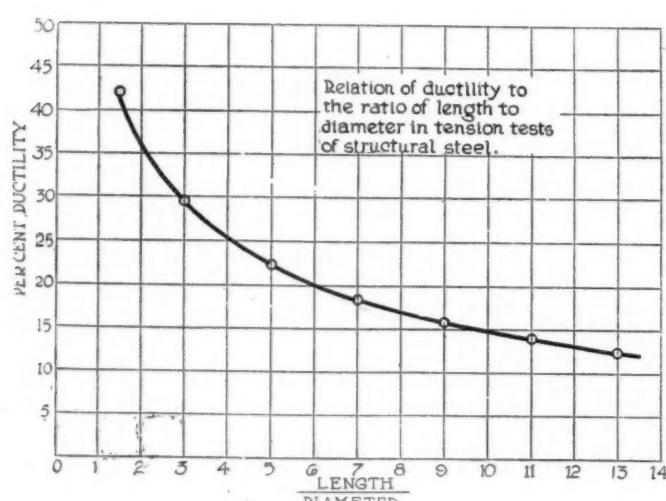


Fig. 1

ones from the point of accuracy. It is an exception when a jaw can be made to grip a flat bar evenly across the entire width of the piece. The error that may be introduced in a test of a brittle or semi-brittle material by this eccentricity is almost unbelievable. In one case of a flat test bar, pulled under the best conditions possible, an eccentricity of 0.01 in. introduced an error 3,000 lb per sq. in., with a total strength of 18,000 lb. per sq. in., thus causing the apparent strength to be 15,000 lb. per sq. in. This was under the best conditions. The possible, and even the probable error, is much greater.

Causes of error in the testing machine itself are:

- 1—Machine out of balance.
- 2—Wrong ratio of lever arms.
- 3—Lack of alignment.
- 4—Method of balancing beam.

The first cause of error is one which can easily be corrected by the operator. The second will probably be negligible with any standard type of machine and can only be checked up by means of a calibration by any of the well-known methods.

The third, lack of alignment, is liable to occur at any time due to shifting of the table on the knife edges, sticking of the jaws, etc. As long as jaws are used this cause of error is likely to be present. The only way to eliminate it is to use spherical adapters and threaded ends. Under non-alignment would come errors in machining. If threaded ends are used the centering must be done upon the test section and not upon the ends.

The fourth cause depends entirely on the operator. The amount of error which may be introduced by a dishonest operator, especially with a machine whose capacity is far in excess of that necessary, is almost beyond belief. All of these errors in testing can be avoided easily if proper care is taken.

EFFECT OF VARIATIONS IN POURING

Variations in the method of casting are much harder to take care of, and it is seldom that test bar results from one company are exactly comparable with those from another. In fact, frequently those from one plant of a company are not absolutely comparable with those from another plant of the same concern. An attempt has been made by the Aluminum Castings Co. to eliminate this variation by the use of a standard test bar pattern. This pattern is shown in Fig. 2, and the method of casting indicated therein was adopted for two reasons:

1—It makes as far as possible, uniformity of conditions, giving a specimen very nearly independent of the speed of pouring.

2—It gives a good quality of casting, because—

(a) The metal enters the test section from opposite ends at the same time, and the test section is filled before the risers. This tends to make the metal in the test section at the end of solidification, quiet, and also causes the risers to be filled with hotter metal than the test sections themselves, thus making certain that the test section will be solid long before the risers have solidified.

(b) The path of the metal from the sprue to the casting is long, giving a good chance for the dross to float toward the top of the runner and into the riser.

For the sake of speed, this pattern is usually put on a match plate, and a large number of molds may be made by one molder. Since the gating is included in the pattern itself, all variations due to the gating are eliminated. In order to eliminate variations due to ramming of the mold, the use of a squeezer is advisable. This method of casting has given uniform results and is considered by the writer as the best to use in checking metal and melting conditions in aluminum.

In addition to standardizing the method of molding, it is vitally necessary to standardize the temperature of pouring. This effect is well shown in Table 1, which gives the effect of various pouring temperatures upon the standard No. 12 alloy containing 8 per cent copper.

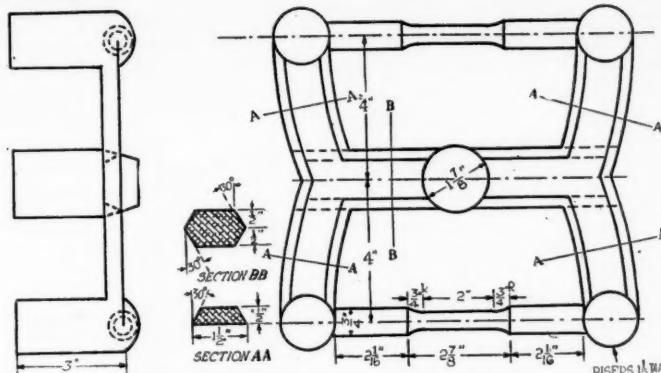


Fig. 2—Pattern for standard test bar

Table 1

Sample No.	Pour. Temp.	Break Str.	% Elong.
1827-M	1300	19883	1.8
1827-N	1400	20120	1.9
1827-O	1500	19831	1.2
1827-P	1600	17404	1.3
1827-Q	1700	17020	1.4

From these values it is evident that in comparing the qualities of metal and check the correctness of melting practice, it is necessary to keep this temperature constant. The values given are for No. 12 alloy which is much less sensitive than some other alloys now coming into use.

It must be borne in mind, that by making test bars in this way we have no check whatever upon the molding variables. The standard test bar checks up the history of the metal up to the time it goes into this mold. If the molding is improperly done, the only way to determine this is to take the casting itself, cut it up into parts and take test specimens from each. Results of tests on several specimens so obtained are given in Tables 2, 3 and 4.

Table 2 shows the physical properties of various parts of an aluminum crankcase used in a well known airplane engine.

Table 3 shows the properties throughout the section of a bronze worm gear made for a widely used automobile axle.

Table 4 shows the properties of various parts of a cast aluminum truck wheel.

Table 2

Location	Break	% Elong.
Thrust bearing near propeller end	28550	2.67
Web supporting crankshaft bearing	22600	2.76
Lugs for attachment to frame	17400	2.00
Wall at transmission end of case	22600	2.00
Crankshaft bearing	19900	2.27

(Each value the average of five tests)

Table 3

Location of Specimens	Yield Point	Tensile Strength	Elong. %	No. of Tests
Outside edge of rim	25806	44546	19.58	12
Center of rim	24505	34810	7.91	12
Inside of rim, edge	23024	27723	5.22	12
Lug	23298	26394	4.37	3
Specimens 1-15	24527	35541	9.53	15
Specimens 1a-15a	23823	32336	9.91	15
Specimens 1b-15b	24490	34136	9.86	15
Rim opposite lug	23955	35246	10.75	18
Rim between lugs	25092	36101	11.37	18

Table 4

Locations	Yield	Breaking Strength	% Elong.	Charpy Impact
Outer edge of rim	10337	18697	5.9	2.12
Inner edge of rim	11650	18572	5.2	2.00
Web	11772	16448	3.5	2.25
Outer edge of hub	13225	17992	5.0	...
Inner edge of hub	13630	17940	3.7	2.69
webs at rim	9899	...	4.5	2.44

These tables, especially Table 2, show that it is possible to check design and molding practice by means of tensile

tests. For example, in Table 2, the gates were secured to the engine lugs, which should be the strongest part of the casting. This test showed that this method of gating was improper and a change was immediately made.

Castings made with metal from a given heat may have better or worse properties than a test bar made from the same heat.

Test bars cast from the same heat as the casting whose results are given in Table 1 tested 24500 lb. sq. in. No figures are available on separate test bars from the heat used in making the casting of Table 2. The individually cast bars from the same heat as that used in making the cast aluminum truck wheel of Table 4 gave a tensile strength of 20000 lb. per sq. in.

Unless molding practice and design are perfect, a casting will vary from point to point, as shown in the above tables. These variations are due to shrinkage, gating methods, the personal element in foundry work and poor design.

SHRINKAGE AS A CAUSE OF WEAKNESS

Nearly everyone is familiar with the pipe in cast steel ingots. In some cases it is necessary to crop—that is, saw off and scrap—15 per cent of the length of an ingot in order to avoid this pipe. This piping is caused by the fact that molten metal occupies more volume than the corresponding weight of solid metal. There are a few exceptions such as the so-called type metals containing antimony. This shrinkage from the molten to the solid state is the greatest cause of weak sections throughout castings. If one part of the casting solidifies much before the other, the first part will shrink and be fed up by the second, leaving insufficient metal to supply this second part. This will then be left spongy and weak. There are two remedies. First, the gating may be so arranged that when the mold cavity is full the length of the path which the metal has traveled will have been such that the heavy sections will be filled with colder metal than the thin sections. Due to mechanical difficulties this has a very limited application. It will be considered later under gating.

Secondly, risers may be used which are attached to the last part of the casting to solidify. These risers must be so located and of such a size that they will remain molten longer than the casting; otherwise they simply act the same as the first section mentioned and increase the sponginess of the casting at the joint.

The gate of a casting should be arranged so as to automatically skim the metal. This is more important in iron and brass than in aluminum castings, because of the greater amount of dross with the first two metals. However, it is important in all. The problem of shrinkage may frequently be very much helped by gating. This can be done by so arranging the gates and the distance the metal has to pass through the mold before arriving at its final destination, that all parts will solidify at the same time. Proper gating of a casting is one of the fine arts of present day manufacturing. In gray cast iron the shrinkage is so small that this is not a serious problem, but with the high shrinkage metals, such as brass, bronze, aluminum and magnesium, it requires intelligence and thought.

By personal element is meant care taken in melting and molding practice throughout the foundry; in other words, good or bad workmanship. It is the largest item affecting quality of product, but will not be considered here as it is beyond the scope of this paper.

In a low shrinkage metal like gray cast iron, it is frequently possible to cast a large section near a small one or to reduce a fillet to a minimum. However, this is bad practice even in that metal, and it always leads to bad results in brass or aluminum. As an example of the results of care in design, attention is called to the uniformity of physical properties maintained in the tests given in Table 4.

Considering Tables 2, 3 and 4 from the above discussion, Table 2 shows especially the effect of poor molding practice and poor design. The lugs attached to the frame (third item), show a tensile strength of 17400 lb. per sq. in., which is at least 5000 lower than the average and 11000 lower

than the maximum. The reason for this difference is that the engine lugs were much heavier than the parts of the casting to which they were attached, and the gates were attached to these lugs. All the metal going into the mold, therefore, passed through this part of the cavity, warming it up and causing it to remain molten longer, thus causing shrinkage to occur in it, as well as a very slow crystallization. After this series of tests the gating was moved to another part of the casting and much better results were obtained.

The value of 28,550 lb. per sq. in., taken from the thrust bearing near the propeller end, was caused by the fact that this part of the casting was a long distance from the sprues, giving the metal a good skimming action, as well as allowing it to be very cold when it reached this section. In addition, this part of the mold filled up very quietly, giving ideal conditions for high quality material. Corresponding test bars were poured in individual molds from the same heat, the gating being similar to what would occur in Fig. 2, with the center running left off and one of the risers used as a sprue. These test bars gave a value of 24,500 lb. per sq. in. This comparison is interesting, in that it shows the harmful effect of a stream of metal being allowed to pass through a mold cavity, thus heating it up before the metal in it is allowed to solidify.

The web supporting the crankshaft bearing and the wall at the transmission end of the case were of the same thickness and about the same relative position in the mold. This is well shown in their tensile results. The crankshaft bearing, which has an average tensile strength of only 19,900 lb. per sq. in., was about twice as thick as the adjoining parts of the casting. This difference in section was partially compensated by the use of risers attached to the crankshaft bearing. However, as can be seen, these risers were not fully able to compensate for the weakness in the design.

In Table 3 attention is called to the difference between the tensile strength and the percent elongation of the lug and of the outside edge of the rim, together with the graduation from one to the other. A cast iron circular chill was used at the outside edge of the rim, causing the freezing to be progressive from the outside toward the lug. This is well shown in Physical Properties.

Table 4 is introduced to show how nearly uniform results can be obtained when proper attention is paid to design and to the gating. In the design of this casting particular attention was paid to the elimination of heavy sections. In the molding of it the gating was given very serious thought, and the arrangement of gates, chills and risers was the result of long experiment. This is well shown by the uniformity of physical properties. The weakest section, the web, has long been a difficult point in wheel castings. The close approach of this web to the physical properties of the rest of the casting attests the care taken in molding, gating and pouring.

MOLDING VARIABLES ELIMINATED FROM THE TEST BAR

It may be asked how it is possible to check up metal and melting practice without bringing in at least a part of these molding variations. In answer to this question it may be said that the standard test bar is an almost ideal section in which it is very easy to obtain perfect feeding and skimming. In addition, the shape is such that there are almost no cooling stresses left in it. No matter how carefully we attempt to standardize the molding conditions, some variations will remain and the best we can do is to try to keep them as small as possible. As stated before, the method of gating shown in Fig. 2 almost entirely eliminates these variations.

In contrast to the test bar section, the average commercial casting is so complicated, that perfect feeding and gating is impossible. The greater the skill and intelligence of the man first laying out the job for production, the more nearly these perfect conditions will be approximated.

The third reason for carrying out physical tests would be to give assistance in design by furnishing data on the

mechanical strength of materials. There are few cases where it is possible to compute the actual loads which a machine part has to stand, as illustrated by the discussion constantly going on regarding the proper method of computing stresses in the crankshafts of automobile and airplane engines. Uncertainty regarding the load on even a comparatively simple machine part is usually much greater than that regarding the quality of the material entering into it or regarding the formulae used for computing the stresses after the load has once been determined.

The only way to tell with certainty how any part will act in service is to actually put in it service and run it to destruction. Naturally, this is a long and expensive process and rarely applicable. Therefore, we frequently are confronted with the so-called imitation tests in which a machine part is given an accelerated test under conditions as nearly as possible the same as would obtain in practice.

The question of imitation tests was discussed in an article in AUTOMOTIVE INDUSTRIES of Sept. 11, 1919, by Dr. Walter Rosenhain in which he says: "First, * * in order to obtain definite and reliable results which have a meaning capable of definite quantitative interpretation, we should seek to make our mechanical test as simple as possible, seeking to measure one physical property or constant at a time, and

avoiding the snare and delusion of the 'imitation' test." "Second, * * we should seek to express our opinion of the relative importance of the various mechanical properties or constants in terms of definite 'figures of merit' which can be tested by comparison with service results."

While not going as far as Dr. Rosenhain in condemning the imitation test, the writer believes that a wide experience with materials and with machine parts as well as a thorough knowledge of mechanics of forces is necessary to plan and interpret such tests.

Test bar results should certainly not be used blindly in designing. Frequently the difference between test bar results and the properties of the casting are allowed for in a factor of safety. When a factor of safety is given to cover this difference, considerable errors are liable to arise on either the safe or the unsafe side. The use of a factor of safety on test bar results without a proper appreciation of the limitations of such data has done much to give the "factor of safety" the title "factor of ignorance." To use test bar results intelligently in machine design requires not merely a wide knowledge of the mechanics of the distribution of stresses, but also a considerable experience of the way in which the properties of materials vary in different sizes and shapes of castings.

Patent Policy of Public Laboratory

THE necessity on the part of public laboratories, whether maintained by the government, educational institutions or private endowment, of having a definite patent policy to the end that their own interests, as well as those of the public, may be conserved, is pointed out in an article in the Journal of the Patent Office Society by Wm. D. Shoemaker. He states in part:

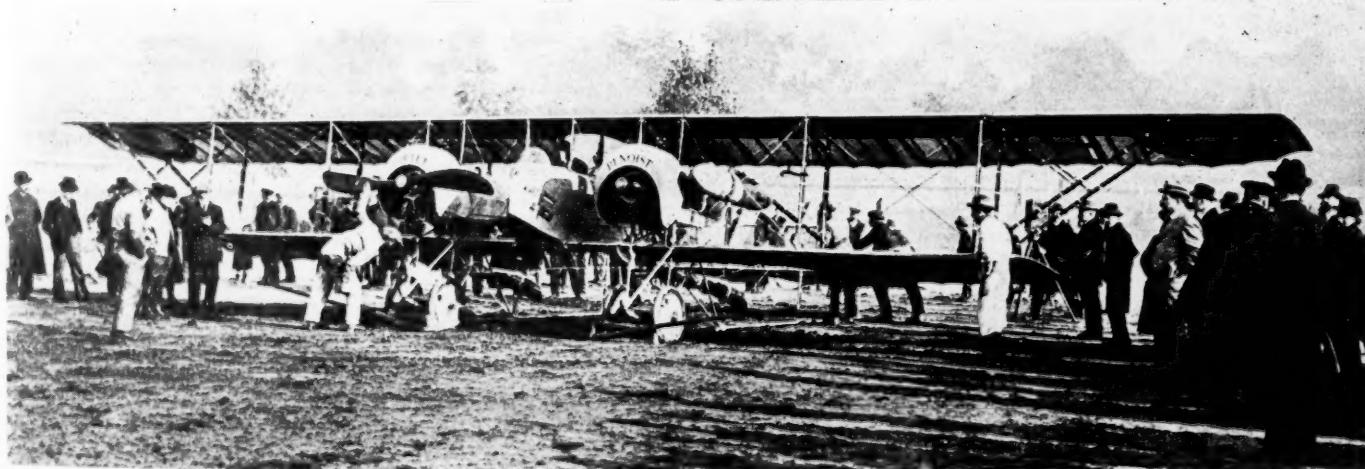
"Inventions without patent protection, unless of striking value, are not likely to become practically available to the public. Hardheaded financiers, manufacturers and business men do not recognize them as possibilities for profit, and these are the agents through whom they must be made of value to the public. With patent protection, however, they are of greater value to the commercial man, and he is often willing to pay for the privilege of using a patented invention, as he can be assured that competition in the use or production of it will be limited. On the other hand he would not be attracted by the announcement of an unpatented invention or induced to promote the development thereof.

"A principal object of a public laboratory is to give

promptly to the public the benefits of the research work done there. Many are the inventions developed, but not all find their way into print or public use. Under our patent laws and the decisions interpreting them, after an invention has been conceived and demonstrated in a laboratory, it is possible for another and subsequent inventor to obtain a valid patent for it. The second inventor having first disclosed the invention to the public, is in the eyes of the law the first inventor. The object of the public laboratory is therefore not accomplished until the invention has been given to the public by publicly printing a description of it, or by placing an actual embodiment thereof in public use, or in lieu thereof, by filing an application for patent promptly.

"Officials of public laboratories are disposed, when confronted with such a situation, to 'find fault' with the patent laws and the Patent Office. They have, however, only themselves to blame in failing to adopt some definite and adequate patent policy. They must realize that the laws were made for the benefit of the largest number, and that their duty is to conform to the spirit thereof."

Tuning Up for the World Encircling Flight



This photograph shows the start of the new type plane piloted by Poulet and Benoist, who are making good time in their flight around the world. The first flight was scheduled to Melbourne.

Why Laws Are Not the Solution of Labor Problems

Of course, you all know that the court action did not decide the miners' strike and that it was made perfectly clear in Washington that compulsory arbitration as planned in the Cummins railroad bill was not going to settle railroad troubles for all time to come. But had you stopped to think under the surface on these questions? Perhaps Mr. Tipper will be able to give to you a bit of the philosophy of this tangle

By Harry Tipper

A FEW weeks ago I pointed out the futility of the injunction brought against the leaders of the coal miners as a means of aiding in the solution of this question, and expressed my regret that it was necessary to issue this injunction because of the confusion which was bound to result from bringing legal questions into the dispute, and because of the fact that the bitterness would not be decreased thereby.

The present situation in respect of coal production indicates the correctness of this view. The coal miners have not yet gone back to work in any great numbers. The rescinding of the strike under the ruling of court has not increased to appreciative extent, their desire to return. It has simply added to the contempt for legal proceedings which already exist in the minds of many of the workers, and brings into question the power of the law in the minds of the whole citizenship.

For the same reason the clause on compulsory arbitration entered in the Cummins Bill for the operation of the railroads, is of no practical value.

Unless the workers agree to compulsory arbitration, the law cannot be enforced without the existence of a police force or a military establishment many times the size of the one we now possess. Regulation of this kind must come out of the agreement of a majority of the parties at interest to the principles behind the regulation, and not imposed upon them before they are ready to acquiesce.

The whole practical outcome of the injunction proceedings at Indianapolis is to turn the law of the United States into a joke as far as that proceeding is concerned. Compulsory arbitration would fare no better with the present attitude of the workers in regard to legal intervention in these industrial questions.

In spirit, of course, the action of the coal miners, in staying away from work after the strike order was rescinded, is rebellion against the law. Lack of disorder does not mitigate this action nor make it any the less rebellious.

With such an example in front of us, the idea of imposing arbitration on a large body of organized labor is not only absurd, but may be dangerous in its outcome.

In the President's message to Congress there is a clause relating to the conditions in industry between labor and capital and suggesting to Congress the necessity for passage of regulations having to do with changing these conditions. It is amazing to find the Government still attempting to devise regulations which will govern the rules between capital and labor with so conspicuous an example of the failure of regu-

lation before us. No manufacturer can look to Government regulations to solve his troubles and it is to be expected that the manufacturer would combat such regulations even where it appears to take care of his necessities because of the dangerous possibilities contained in its attempted enforcement.

Unfortunately capital, as such and particularly the financial men who control the flow of capital, have not realized the danger of regulation and the absurdity of attempting to standardize working conditions by governmental action.

We have allowed ourselves to be ruled by our legal advisers to such a degree that we have come to look upon legislation as a panacea which will of itself bring about improved morals and improved industrial conditions. Every action which is taken in this respect is one more justification for the doctrine of collectivism which has for its central theme the complete standardization of social organization. The only regulation which can be enforced successfully is the regulation against capital and management, because the controllers of capital and the managers of industry are comparatively few in number, and the police powers is sufficient at all times to be exercised in enforcing such regulations.

In this connection it is interesting to note the statement of Vice-President Woll of the Federation of Labor in his public article on the cause of unrest. At the beginning of this statement the injunction and compulsory arbitration are bitterly opposed. If Vice-President Woll speaks the opinion of a majority of the trade unionists affiliated with the American Federation, he is speaking for something over 2,000,000 people at the least, and if these 2,000,000 people do not like compulsory arbitration or enforcement of production by injunction, even in the case of a government contract, what machinery do we possess for the enforcement of these regulations? There is no governmental power in the United States which can enforce any law against the opposition of so many of its citizens.

While I am referring to the statement of Vice-President Woll, it is interesting to note his admission of the individual inequality of individuals, something which is directly contrary to the practical methods of the trade union and directly in favor of reward for individual service. This statement is as follows:

"Of course, nature has endowed individuals, as it has nations, with certain physical, mental and spiritual advantages, one over another. Organized society cannot successfully interfere with these processes of nature."

If this principle were recognized in the practical operation of trade unionism, the result would be a departure from the

standard wage and a recognition of individual variation in the wage earned and paid. If the executives of the American Federation of Labor and the more important labor leaders are beginning to recognize the individual variation in value, it holds out some hope that the deadly standard wage agitation which has done so much to limit the individual incentive will begin to decrease.

On the morning of December 1st, the Sun in New York published a survey of labor conditions in the chief industrial centers of the United States. The conclusions which are reached by the Sun from the information received are contained in the following paragraphs which are quoted here-with.

"In sections of the country where the open shop prevails, conditions are better than in those places that are strongly unionized. Individual production also is higher in factories where the relations between capital and labor are close, or where the co-operative system is employed.

"Generally throughout the country wages have been increased in the last five years, but production has fallen down, the greatest decrease coming since the signing of the armistice. Manufacturers and large employers of labor pay tribute to the patriotism of workers during the war, asserting that the individual output then was phenomenal. Conditions at present show that with the increased wages paid in all lines, thrift is disappearing and that dissatisfaction is growing, resulting in smaller output per man."

Unquestionably these conclusions are correct in a general way. The percentages are useless because the reports from the individual cities are so indefinite that the exact meaning involved in the term production cannot be secured. In fact, the reports are too general, anyway. They do not go into the various factors of production and they do not point out any new elements in the situation. They merely reinforce what is generally known, first that production per man is less, second that this lessened production occurs in the face of a large increase of wages, third that under the incentive of patriotism during the war the production increased per man,

per hour, but that with the removal of that incentive the per man, per hour production, immediately dropped. It also cites three significant exceptions to this rule.

First, conditions are better in the open shop, individual production is higher where the relations between capital and labor are close, or where the co-operative system is employed.

What is meant by the co-operative system is far too indefinite. Whether it means profit-sharing, machinery for discussion, bonus systems, or what, is not indicated, nor is there any indication of the large variance in the results of different factories where some system involving closer co-operation has been applied.

The statement as made, however, has emphasized again the fact that individual production is the direct by-product of the relation between management and labor in the individual plant. It emphasizes once more the fact that wages do not solve any of the problems. High wages, with all the other causes of dissatisfaction still in existence, are merely a stopping place on the way to greater demands and in many cases they afford the means or escape from work which is either disagreeable or monotonous but which could not be escaped so easily under previous conditions.

A continuance of strikes, with a continuance of the decreased production per man and the increased wages, spells a greater shortage of production, higher prices for the individual production unit and a worse condition of unrest. The problem is serious and the manufacturer who looks for Governmental action to solve it is waiting for the mirage to turn into a reality. The financial man who is laying back waiting for injunctions, compulsory arbitration and for the action of union leaders to lay the bases for the solution is greatly at sea.

The problem must be tackled or the conditions will be very much worse before there is any hope of improvement, and the individual manufacturer must accept the responsibility of solving the problems for his own factory in co-operation with the best of his own men, in a manner that is suitable to the conditions in that factory.

Mechanical Engineers Discuss Automotive Trend

(Continued from Page 1161)

steam engine cross-head bushings. It seems that the lubricating hole should be placed at right angles to the connecting rod. Further, these bronze composition bushings should not be reamed with the standard reamer but tooled with a sharp single cutting tool.

In answer to an inquiry as to the objections to burnishing a brass or bronze bushing, Bierbaum showed numerous micro photographs illustrating the surface effects of burnishing, reaming with standard reamers and using dull tools. Burnishing with a steel tool, a number of tests showed, distorted the surface fibers of the bronze, crushing the delta (or hardest) crystals and leaving the soft alpha formations to furnish the bearing surface. Standard reamers likewise produced this effect, but usually caused a deeper fiber deformation, compressing the metal beyond its elastic limit to a considerable depth. The result of dull tools was similar, but in addition a rough surface was left behind.

Curiously enough, every illustration of faulty tooling was a truck rear axle drive gear or worm. Norton strongly endorsed the ideas regarding bushings expressed in the paper and added that brass bushings should be given 0.005 in. clearance for the formation of a good oil film. He also remarked that plain bearings should run warm and that one should become suspicious of his bearing if it did not "warm up" to its work.

The ball bearing paper brought out discussion from Hess, roller bearing interests and, of course, the graphite men. At this point the automotive man would have been a little uneasy about the trend of the topic. That ball bearings should never be run in grease was universally endorsed. Hess went so far as to say that not even heavy oil should be used. The statement that ball bearings should never be run submerged in oil also met general favor. The very urgent need of keeping all traces of acids from the balls and races met with the unqualified approval of the members and that all traces of grit, however fine, should be carefully excluded.

Lubricating a ball bearing by a few drops of oil at a time, enough to keep the temperature of the bearing within reasonable limits, seemed to be the general sentiment. When the statement was first made that graphite was detrimental to ball bearings, the graphite men wanted to know the grounds for such sweeping condemnation of their product. The testimonials of several of those present should have been satisfactory evidence that graphite in any form can do a ball bearing no good. Even the roller bearing people could say nothing in praise of graphite for their bearings, although the harm in such cases is not so great.

In conclusion it can be safely said that the recent A. S. M. E. meeting developed considerable food for thought for the automotive engineer.

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Lesson From the Coal Strike

HERE is one thing about strikes that is worthy of consideration. In the discussion of the causes, one often is impressed with the opportunity of another industry to help out the situation in the troubled field. Also, every strike brings a new lesson as to the interdependence of industry.

In the discussions of the coal strike it was brought out that one reason for the high demands of the coal miners was that their industry was so greatly seasonal. They had a brisk fall, a very busy winter, little to do in the spring and less to do in the summer. Consequently, a good many idle men in the summer were able to think up trouble-making schemes.

Those who know the coal business best assert that if the work for the year could be equalized, so that a fairly average wage could be assured, that it would put the industry on a much better footing.

To bring this thought home: How about your own factory? Has it been as heavy a summer buyer of coal

as it might have been? Was any effort made at storage of more than enough coal to help over a few days when there might be a freight congestion in the yards?

Every day brings evidence that the manufacturer must not only study his own special line, but that he must also study and take into consideration the needs of the kindred trades.

Trucks As Railway Feeders

WE would call the attention of truck makers to this item from The Railway Age. It needs no comment:

"The use of motor vehicles as feeders to the railroads is said to be more extended in Italy than in any other country in the world. This is owing to the fact that Italy is a mountainous country in which railroad lines can only be built at considerable cost and labor. The total length of railroad lines in Italy is 8,700 miles, while the length of routes over which motor services are run with a fixed time table is 8,070 miles. There are 400 of these lines over which regular public services are run either as feeders to the railroad or in order to open up country which has remained inaccessible to the railroad.

"These public automobile services for goods and passengers were begun in a small way ten years ago in order to meet the deficiencies of the railroad system."

End of National Tractor Demonstrations

AFTER the fiasco of the last two national demonstrations of farm tractors, the decision of the National Implement and Tractor Manufacturers' Association to discontinue such demonstrations does not come as a surprise. There may have been a need for a national demonstration in the early years when the tractor was a curiosity. At that time only comparatively wealthy farmers were interested, and they were willing to travel a long distance and put up with a lot of inconvenience in order to see a variety of the machines doing real work. But today there are tractors in use in practically every county, and the appeal of the manufacturers is more to the average farmer, whose enthusiasm is not so easily aroused. Merely seeing a tractor pull a plow is not such a novel sight to-day as to tempt a farmer to neglect his work for a week and incur the expense of a long railway journey.

This sight of a number of tractors at work is about all the national tractor demonstrations offered the farmer. There was no sort of test for the enlightenment of the visiting public and no attempt at a real competitive demonstration. If drawbar tests were made, the results were given only to the manufacturers concerned, who could make them public or not, as they chose. The result was that the farmers remained away and the demonstrations served no useful purpose. On the other hand, the tractor shows in winter have been drawing large crowds. The farmer at that time has more leisure, and,

besides, an indoor show affords better opportunity for study and discussion, hence the visitor is more apt to carry away some definite impression.

It is not to be understood that there will be no tractor demonstrations in the future. When properly organized, local demonstrations can undoubtedly be made a success. In the leading farming districts automobiles are exceedingly common, and if a demonstration is arranged that will really show the farmers the performing characteristics of the different machines, farmers from within a radius of 70 to 80 miles can be counted on to attend.

On the whole, tractor demonstrations must be given a more serious character than they have had in the past; the tractors must be given a full day's work each day the demonstration lasts, and, besides, the demonstration must be brought to within more convenient reach of the farmer than have been the national demonstrations of the past.

No Workers Needed in France

THE War Department has come out with a square denial of the reports circulating in this country that there is a good opening in France for workers who care to go to that country. Such reports have been circulating for some time and have been causing some discontent.

The War Department explains that the French government does not want to employ Americans in reconstruction works and that none of the American companies having reconstruction contracts in France have as yet started work there. This means that France is not a lure for the American worker with a bit of wanderlust in his system. The word from France indicates that enough Frenchmen survived the war to take care of the work available there. The sign appears to read, "No Americans need apply."

More Talk About Trade Marks

THE importance of registering a trade-mark abroad seems still to be too little appreciated, in spite of the many warnings that have been sounded by United States Consuls. As a matter of fact, many valuable trade-marks have been pirated abroad merely because the owners of these marks neglected to register them. The laws of foreign countries require a trade-mark to be registered to become a valid trade-mark. Persons knowing the value of American trade-marks have gone ahead, registered these marks in their own name, thereby acquiring exclusive proprietorship thereof, and then, when the rightful owners sent their goods marked with such marks into that particular country, their goods were held up and they were made to pay large sums of money to the person or persons who had registered the marks.

Recently, the Bureau of Foreign and Domestic Commerce reports that there has been a systematic registration of American trade-marks and trade names in South American States and more especially in Brazil, without the authorization of the owners in the United

States. One firm in Brazil alone is reported to have in this way registered more than 50 American trade-marks with the result that said firm absolutely controls the sale of the goods in Brazil bearing these marks.

In the United States, where by the adoption and sole use of a trade-mark the exclusive right thereto is acquired at common law, business men do not realize that conditions are different abroad, where formal registration alone gives the exclusive right to the use of a trade-mark. Even in the United States, it is customary now for owners of trade-marks to register the same under the Federal Statute at the Patent Office in Washington, though the right to a trade-mark exists at common law. In foreign countries, registration is *compulsory*, since not the mere adoption and use of a trade-mark, but registration alone confers the exclusive property right upon its owner. It should also be noted that a number of foreign countries makes registration contingent upon registration of the trade-mark in the country of origin, hence the necessity of first registering a trade-mark in the United States.

Tobacco Threat Dies

HERE is much in the way of laws and proposed laws that is causing discontent in certain places these days, so it is a relief to be able to learn of a false report once in a while. The trouble is that the denial of a rumor never catches up with the original story.

Following closely upon the passage of the prohibition amendment to the Federal Constitution came a report that the Methodist Temperance Society was backing a move to prohibit the sale of tobacco in the same way. As the Methodist Society has been very active in the campaign for prohibition, this report of a new activity was accepted at full value. There has come from time to time denials from individuals prominent in this society, but these were received with doubts. At a recent meeting of the Executive Board of the Society in Washington an official denial was issued.

While this denial does not go to the extent of approving of the use of tobacco, it does say very emphatically that the Society is not going to ask a legal ban except below the present legal sale age.

It might be a good idea for employers to help get this news to men, and perhaps women, who are feeling that their rights are being too much trampled upon.

Small Cars for Europe

WITH so many of the powerful French automobile concerns turning their attention to large, luxurious cars, the most promising field to the foreign manufacturer is that of the small economical car. But so far as American makers are concerned, to cater to this market would mean the production of a special export model. With all the obstacles in the way to successful export business with France—exceedingly high duty, constantly declining rate of exchange, etc.—the inducements to make the necessary investment are not very great. Probably most of our manufacturers will remain content with the business they can secure with their regular stock models.

Tractor Shows to Super- Sede National Demonstrations

N. I. V. A. Department Decides Former Demonstration No Longer Necessary to Establish Efficiency of Tractors as Labor-Saving Equipment

CHICAGO, Dec. 9.—Tractor demonstrations in the year 1920 will be of local character at the option of the individual manufacturer and limited to one day.

This was determined at the meeting of the Tractor and Thresher Department of the N. I. V. A. held in Chicago, Dec. 2 and 3, when the department recommended that no national or regional tractor demonstrations be held in the coming year. It is believed that national and regional demonstrations have served their purpose and that the country at large no longer requires proof of the efficiency of the tractor as a labor-saving farm equipment.

It is also believed that the grouping of the latest models of tractors and tractor equipment and accessories at several points will afford those interested in power farming a better opportunity of keeping in touch with the constantly increasing development taking place.

The same resolution determined the policy with reference to tractor demonstrations, also recommended that the demonstration and tractor show committees be consolidated into one committee to be known as the National Tractor Demonstration and Show Committee. This body will in the future have charge of all exhibitions of steam and gas tractors, threshers, and such other tractors, drawn or driven machinery, as the committee may agree upon. This supervision will cover all indoor exhibitions commonly known as tractor shows.

The tractor manufacturers decided to take into their own hands the management of tractor shows of national scope, determining to hold at least one or more shows of such national character each year and to admit only such manufacturers who will abide by the rules of the committee with regard to the policies of the department as to tractor demonstrations and shows.

The department requested the Kansas City Tractor Club to change its dates for the tractor show to be held in that city, so as to avert any conflict which might arise as a result of the dates of the Kansas City and Wichita shows. In consequence, the Kansas City Tractor Club postponed its show until the week of Feb. 16-21. This change will now permit the manufacturers to exhibit conveniently at Minneapolis, Wichita and Kansas City.

One of the interesting developments of the meeting was the address of

Professor L. W. Chase of Nebraska University, who in an illustrated talk showed what is being done in that state with regard to tractor testing. Professor Chase declared that the Nebraska law is boosting the tractor business among the farmers, as the latter have already learned to depend upon the Agricultural Colleges and the Experiment Stations, and therefore are ready to accept result of tractor tests conducted by governmental agencies.

E. B. McCormick, chief of the Bureau of Rural Engineering, in speaking upon the subject of tractor tests indicated that the government expects to co-operate in this matter, and that the Department of Agriculture looks forward to carrying on tests which will in nowise conflict with the state tests, but which will supplement them at present with the expectation of ultimately supplanting them.

Thomas B. McDonald, also of the Department of Agriculture, submitted a very interesting article upon the "Relation of the Department of Agriculture to the Farm Operating Equipment Industry." McDonald corroborated the statements made by McCormick, declaring that the Secretary of Agriculture recognizes the importance of rating and testing tractors, and that he has made adequate in his recommendations to Congress for a sum sufficient to inaugurate this work.

Two principles, he asserts, should define the relations to the Department to the agricultural industries; (1) Should determine the needs of the industry and find the best means of meeting them; (2) should carry on this co-operative activity in such a manner that the impositions of regulatory measures will not be necessary, but that the enforcement of these principles may be entrusted to the industry itself.

Finley P. Mount, Chairman of the Terms Committee, said there should be no relaxation in the terms as they now stand. He expressed the hope that those manufacturers who have felt constrained to go beyond the limits, will be able to comply with the terms as recommended.

In reporting on the elimination of separator sizes, C. S. Brantingham stated that there has been a marked improvement in the elimination of varieties. It is hoped that a still further reduction in the number of sizes can be obtained in some instances.

E. J. Gittins of the J. I. Case Threshing Machine Co., will head the department during the ensuing year, succeeding J. B. Bartholomew, the president of the department for a number of years past.

Other officers elected at the meeting were: G. P. Alexander, vice-president; E. C. Merwin, secretary-treasurer. The executive committee is J. A. Everson, chairman; Finley P. Mount, E. J. Gittins, J. B. Bartholomew, E. C. Merwin, H. P. Goodling, Geo. N. Peek, Dent Parrett and C. S. Brantingham.

Larger Equipment

Space at Air Show

CHICAGO, Dec. 8.—The section of the Aeronautical Show of Chicago, set aside for the equipment exhibit, has been moved to the main floor of the show, owing to the former space being all taken by the Glenn L. Martin Co. In the new section eleven spaces remain to be sold.

Program for New

York Show Week

NEW YORK, Dec. 30.—Besides the great "double header" automobile show which opens Saturday, Jan. 3, at the Grand Central Palace and the Eighth Coast Artillery Armory, there will be many meetings and dinners for men in the various divisions of the automotive industries. Important among them are the sessions of the N. A. C. C., Society of Automotive Engineers, Motor and Accessory Manufacturers' Association, Rubber Association of America, Automobile Club of America, and others.

The program for the week follows:

SATURDAY, JANUARY 3

- 2:00 P. M.—Passenger Car Show Opening—Four Floors, Grand Central Palace.
- 2:00 P. M.—Motor Truck Show Opening—8th Coast Artillery Armory, Jerome Avenue, Kingsbridge Road and 194th Street.
- 8:15 P. M.—Highway Transport Conference Inaugural Session, 8th Coast Artillery Armory, Jerome Avenue, Kingsbridge Road and 194th Street.

MONDAY, JANUARY 5

- 10 A. M.—10:30 P. M.—Passenger Car Shows—Four Floors, Grand Central Palace.
- 10 A. M.—10:30 P. M.—Motor Truck Show—8th Coast Artillery Armory.
- 2:15 P. M.—Highway Transport Conference Session—"Merchandising Motor Trucks"—8th Coast Artillery Armory.
- 8:15 P. M.—Highway Transport Conference Session—"Motor Vehicles in Passenger Transportation"—8th Coast Artillery Armory.
- 2:00 P. M.—Meeting, Automotive Service Association, Automobile Club of America. Dinner—Rubber Association of America—Waldorf Hotel.

TUESDAY, JANUARY 6

- 10 A. M.—10:30 P. M.—Passenger Car Show—Four Floors, Grand Central Palace.
- 10 A. M.—10:30 P. M.—Motor Truck Show—8th Coast Artillery Armory.
- 2:15 P. M.—Highway Transport Conference Session—"Smoothing the Path of the Motor Truck," 8th Coast Artillery Armory.
- 8:15 P. M.—Highway Transport Conference Session—"Increasing Motor Haulage Efficiency," 8th Coast Artillery Armory.
- 10 A. M.—Meeting of Motor Truck Committee, National Automobile Chamber of Commerce, Inc.
- 10 A. M. and 2 P. M.—Meeting of Standard Committee, Society of Automotive Engineers, Fifth floor Auditorium, Engineering Societies Building, 29 West 39th Street.
- 7 P. M.—Dinner, National Automobile Chamber of Commerce, Hotel Commodore.

WEDNESDAY, JANUARY 7

- 10 A. M.—10:30 P. M.—Passenger Car Show—Four Floors, Grand Central Palace.

10 A. M.—10:30 P. M.—Motor Truck Show, 8th Coast Artillery Armory.
2:15 P. M.—Highway Transport Conference Session—“Selling on the Firing Line,” 8th Coast Artillery Armory.
8:15 P. M.—Highway Transport Conference Session—“Rural Motor Express,” 8th Coast Artillery Armory.
9:30 A. M.—Meeting of Executive Committee, Motor and Accessory Manufacturers Association, at offices of Association, Aeolian Building.
10 A. M.—Meeting of Directors, National Automobile Chamber of Commerce.
10 A. M.—Meeting of Finance Committee, Motor and Accessory Manufacturers Association, at offices of Association, Aeolian Building.
10 A. M.—Business Session, Society of Automotive Engineers.
11 A. M.—Meeting of Board of Directors, Motor and Accessory Manufacturers Association, offices of Association, Aeolian Building.
12:30 A. M.—Luncheon and Meeting, National Automobile Show Managers Association, at Headquarters of Automobile Dealers Association, 1845 Broadway.
1 P. M.—Luncheon, Professional Session of Society of Automotive Engineers.
2 P. M.—Professional Session of Society of Automotive Engineers, Auditorium, Engineering Society Building, 29 West 39th Street.
3 P. M.—Sixteenth Annual Meeting of Motor and Accessory Manufacturers Association, Grand Ball Room, Hotel Commodore.
3 P. M.—Meeting of Service Committee, National Automobile Chamber of Commerce.
7:30 P. M.—Twelfth Annual Banquet of Motor and Accessory Manufacturers Association, Grand Ball Room, Hotel Commodore.
9 P. M.—Carnival Night, Society of Automotive Engineers, Hotel Astor.

THURSDAY, JANUARY 8

10 A. M.—10:30 P. M.—Passenger Car Show, Four Floors, Grand Central Palace.
10 A. M.—10:30 P. M.—Motor Truck Show, 8th Coast Artillery Armory.
2:15 P. M.—Highway Transport Conference Session—“In the Matter of Service,” 8th Coast Artillery Armory.
8:15 P. M.—Highway Transport Conference Session—“Aids to Motor Truck Efficiency,” 8th Coast Artillery Armory.
10 A. M.—Meeting of Advertising Managers, National Automobile Chamber of Commerce.
10 A. M. and 2 P. M.—Fuel and Research Professional Session, Society of Automotive Engineers, Auditorium, Engineering Societies Building, 29 West 39th Street.
1 P. M.—Society of Automotive Engineers Luncheon.
2:30 P. M.—Meeting of Board of Directors of Motor and Accessory Manufacturers Association, offices of Association, Aeolian Building.
7 P. M.—Society of Automotive Engineers Dinner, Hotel Astor.

FRIDAY, JANUARY 9

10 A. M.—10:30 P. M.—Passenger Car Show—Four Floors, Grand Central Palace.
10 A. M.—10:30 P. M.—Motor Truck Show, 8th Coast Artillery Armory.
2:15 P. M.—Highway Transport Conference Session—“Selling Motor Transportation,” 8th Coast Artillery Armory.
8:15 P. M.—Highway Transport Conference Session—“Motor Truck and Railroad Freighting,” 8th Coast Artillery Armory.

SATURDAY, JANUARY 10

10 A. M.—10:30 P. M.—Passenger Car Show—Four Floors, Grand Central Palace.
10 A. M.—10:30 P. M.—Motor Truck Show, 8th Coast Artillery Armory.
2:15 P. M.—Highway Transport Conference Session—“Highways and Motor Transport,” 8th Coast Artillery Armory.
8:15 P. M.—Special Motion Picture Show.

CHARTERS GRANTED

WILMINGTON, Del., Dec. 8—The Rambler Rubber Corp., of Wilmington has been chartered under the laws of Delaware with a capital of \$50,000, to manufacture automobile tires. N. N. Kenney, M. Butler and M. M. Lucey, all of Wilmington, are the incorporators.

The duPont Motors Manufacturing Corp. of Wilmington has filed a certificate amending its charter, so as to permit of increasing the capital stock from \$100,000 to \$200,000.

U. S. Court Dismisses Move to Cancel Cross-Licensing

Suit Against National Automobile Chamber of Commerce to Have Agreement Declared Void and Cancelled Is Lost by Locomobile Company of America

NEW YORK, Nov. 29.—The United States District Court for the Southern District of New York, Judge Hand presiding, has dismissed the case of the Locomobile Company of America against the National Automobile Chamber of Commerce, Inc., in which the Locomobile Co. sued to have the cross-licensing agreement declared void and cancelled. This is the agreement, entered into by more than 100 manufacturers, which provides for the exchange of patent rights without the payment of royalties. It has been considered by the automotive industry generally to be a highly helpful co-operative and constructive arrangement, working to the ultimate benefit of buyers of motor cars.

Judge Hand, in dismissing the bill, stated that no leave to amend will be granted unless the complainant states its desire to have this right because it can bring in the lacking indispensable parties. Frederick P. Fish, Charles Neave and Merrill E. Clark, counsel for the chamber, have expressed the opinion that this will require the Locomobile Co. to join together all the members of the chamber who are parties to the cross-licensing agreement as defendants in a single suit, which would be difficult because there is no one district in the United States where all the cross-licenses jointly can be used.

Extracts from Judge Hand's decision follow:

“The defendant moves to dismiss the bill for want of indispensable parties.

“The complainant alleges that the defendant is a membership corporation of which complainant and other manufacturers of automobiles are members. The complainant entered into a cross-licensing agreement with defendant. The numerous other automobile manufacturers entered into like agreements. By the terms of all these agreements each manufacturer empowered the defendant to grant all others who executed similar agreements, licenses and shoprights under all patents at the time owned or controlled, or which should thereafter be controlled by the grantor, and the defendant agreed to grant to such grantor in return all licenses and shoprights which it is authorized to grant under the instruments equivalent to this, executed by other members of the chamber.”

“The complainant prays (1) that the defendant be enjoined from granting any licenses; (2) that the cross-licensing agreement be declared void and cancelled; (3) that all rights acquired by any parties thereunder be restored to those who granted such rights.

“It is urged by complainant that this suit can be maintained as a so-called ‘class-suit.’ There is no common interest

or common fund. The complainant, moreover, does not allege that it sues on behalf of all other automobile manufacturers similarly situated. One grantor may in practice avail himself of one patent and another of others. Moreover, the defendant has no licenses whatsoever. The other manufacturers are clearly indispensable parties. If the complainant cannot obtain jurisdiction over them, it will have to be satisfied to obtain such relief as it may be entitled to by means of a suit by the Government.

“It is said that while the prayer of the bill is too broad in attempting to secure the return of licenses which have already been granted, it is good as a means of preventing the execution of further licenses and the carrying out of an illegal agreement. The bill, if enforceable, would seek to divest not only these legal rights already vested, but equitable rights to secure licenses which have already accrued on existing patents from ripening into actual licenses. Moreover there is a contract right in every manufacturer who has signed the agreement to obtain future licenses of patents not now in being. I do not think the complainant can enjoin the defendant from performing its contract with the other manufacturers as to licenses of future patents, without giving them a hearing when this would destroy a right to a specific res, namely, a license or shop-right, the moment the patent to which it was appurtenant came into being.

“The bill should be dismissed with costs. No leave to amend will be granted unless the complainant states its desire to have this right because it can bring in the lacking indispensable parties.”

TO HOLD SIXTH SHOW

BETHLEHEM, Pa., Dec. 5.—The Sixth Annual Lehigh Valley Auto Shows will be held in the Colosseum, this city, under the auspices of the Bethlehem Trades Association. The passenger car show will be held Feb. 23 to 28, and the truck and automotive equipment show, Mar. 1 to 4. J. L. Elliott will be manager.

EXTEND ST. LOUIS TRADE

ST. LOUIS, Dec. 8—The Strauss Motor Car Co., will erect the first Ford sales and service station in down-town St. Louis. It will be at 1119-1123 Pine Street, four stories, and will cost \$189,000. The lot is 65x109 ft. The lease on the property is for ten years.

AMERICAN INVASION FEARS ARE SCORNED

British Post-War Imports Only Continuance of Steady Trade Development

LONDON, Nov. 10 (Special Correspondence)—A recent issue of the London Times contains a scare article with the title "American Motor Invasion"—"British Makers' Fears Confirmed"—"A Four Years' Start." It is from "Our Motoring Correspondent" and emanates from Detroit, dated Oct. 8.

For all that is fresh, this screed might as well have been written in London by a strict protectionist member of the British Motor & Allied Trades Association, and worse still it contains nothing to justify its tone. Briefly recited the writer repeats the assertions:

That American motor factories were in a better position to resume their normal output after the war than British factories.

That at most, American factories were out of normal production for about one year, while British factories were off normal production for five years.

That up to 1913 British manufacturers could hold their own "price for price and value for value" with any foreign competitor excepting the Ford.

That the American car of 1919 is so immeasurably superior to its predecessor of 1913 as to threaten British manufacturers with the most serious competition.

The writer then details certain aspects of the improved up-to-date American car, instancing its comparatively simple layout, more efficient higher speed engine with smaller cylinders' bore and longer piston stroke, the accelerative qualities of the modern American cars and their ability to do all running on "top speed," and the ability to combine both these features with only a three-speed gear layout; their improved spring suspension; the possible disappearance of the magneto, and lastly the reduction of gross weight.

Apparently the "Times" writer has slept a Rip Van Winkle sleep for he seems only now to have discerned as new features, merely those which were existent or a developing trend not in 1913 only, but for the previous two years. Everyone acquainted with the motor trade is or should be aware that the invasion of American cars to Great Britain had attained such proportions even in 1912 as to have occasioned a special stunt by the Protectionist party in the form of a big meeting called by the editor of the "London Daily Express"—a gentleman with the very

British name of Blumenfeld—to discuss this menace in the interest of Protection. The humor of the situation was that some of the chief spokesmen at the meeting were even then interested in importing cars, and one of them was also a director of a British motor manufacturing company.

The "Times" writer does not mention that there is a tariff on all imported cars of 33 1/3 per cent of their value at the British Port of arrival, and not at the factory, which means an all round added import of \$500 a car, on which the tariff rate is based. How this tariff is operating is seen by the fact that a car like the Overland (1919 model) is listed here at \$2375, and at about \$3250 in France, where the tariff is 70 per cent ad valorem. Yet American cars are being sold freely in France, and also—what is not generally known—that one French firm making a big "six" is importing the whole of the components and body for its good class "four" from America, and is able to sell it complete, including tariff and assembling charges at about 100 per cent profit.

**Publication of this issue of
Automotive Industries has been
delayed until Dec. 30 by con-
ditions over which the pub-
lishers have had no control.
Further issues will be forth-
coming as rapidly as they can
be printed.**

The "Times" writer needs to inform himself first that American cars have made good here, and are now to all intents in an unassailable position short of an upheaval of relations between the two nations, and secondly that their success is primarily due to economic causes; in other words, they are wanted because the British makers have preferred to flout the public requirements and disregard the economics of the situation.

The "Times" writer also must know, or can find out easily on reference, that up to the war, the financial status of the British motor industry was not of the best, and if he knows anything of the essentials for production he must be aware that no modern manufacturing business can succeed unless it is amply financed to buy cheaply, and that buying by bills except at short rates precludes this advantage besides in varying ways injuring credit all round.

Other contributory features have been as follows:

Too small a production in individual factories and too great obsession to the all-made-under-the-one-roof policy.

Uneconomical design due largely to a lack of co-operation between drawing office and production departments.

S. A. E. Sections

Arrange Meetings

NEW YORK, Dec. 5—A series of interesting meetings, extending far into Spring, have been arranged by sections of the Society of Automotive Engineers.

Minneapolis has inaugurated a plan by which the design for a complete tractor will be considered at monthly sessions during the period between December and April. A paper dealing with one part of the tractor will be read at each of the meetings, which will be followed by a general discussion. The meetings have been arranged for the first Wednesday of each month.

The topics for the succeeding meetings are:

- Jan. 7—Four Wheel Drive vs. Caterpillar.
- Feb. 4—Bearings.
- Mar. 3—Dynametric Tests.
- Apr. 7—Tractor Weights, Draw Bar Poles.

Other section meetings include: Midwest section, Chicago, Jan. 13, Aeronautic meeting, in connection with the Aeronautical Show. Joint meeting of Metropolitan and Pennsylvania sections, Philadelphia, Jan. 23, subject, The Diesel Engine; Buffalo section, Jan. 27 and Mar. 23.

On Feb. 27, the Pennsylvania section will meet in Pittsburgh. A visit to the Standard Steel Car Co. plant is scheduled after this meeting.

N. A. R. D. Meeting

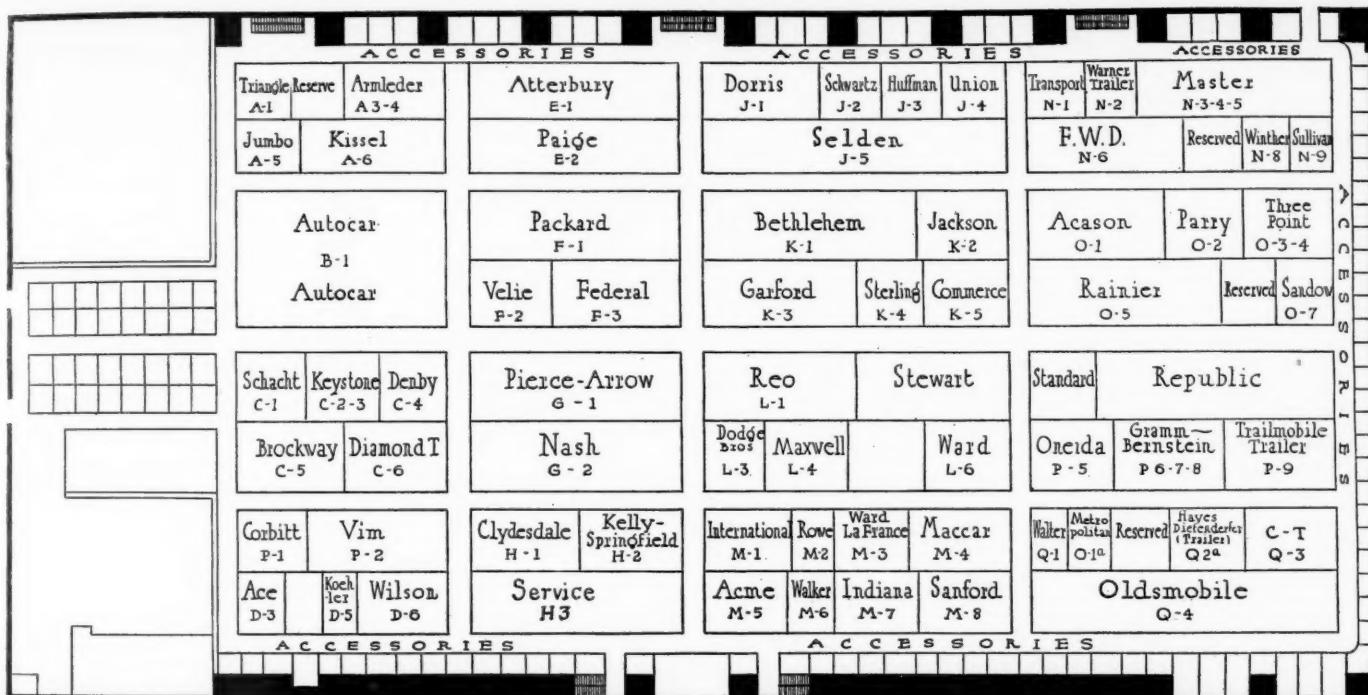
January 26 and 27

CHICAGO, Dec. 8—Members of the National Automobile Dealers' association will hold their annual convention here during Automobile Show week as usual. Notices of the meeting have been sent to members of the association, setting Jan. 26 and 27 as the dates of the convention and naming the LaSalle Hotel here as the place of the big event.

While the notices of the association convention specifically states that there will be "no business," it is expected that considerable will be transacted.

LINK ENGLISH CITIES

WASHINGTON, Dec. 4—An English company has been formed with a capital of \$9,733,000, under the title of Service Transport Co., which proposes by means of a large fleet of motor trucks to link up Leeds, Sheffield, Birmingham and other populous centers, according to recent information received by the Department of Commerce. The stock will be in ordinary shares of \$4.87 each, 1,500,000 of which will be offered for subscription by the public.



Running coincident with the Passenger Car show in Grand Central Palace, the National Motor Truck show, in the Eighth Coast Artillery Armory, New York, Jan. 3-10, promises to be the greatest in the history of the industry. The diagram shows the layout of the great drill shed for the show, with the spaces assigned to the various makes. The truck conferences, scheduled daily during the show, are a big feature of the week's program

NEW STEVENS-DURYEA NEARS COMPLETION

Models for Dealers and Shows Will Leave Chicopee Factory

CHICOPEE, MASS., Dec. 6—The Stevens-Duryea Motor Co., which was revived recently, is getting under way with its models for demonstration by dealers, and exhibition at motor shows. George E. Twitmeyer, the former advertising manager of the Peerless, who has been made salesmanager for Stevens-Duryea, will soon announce the names of dealers in big cities signed up. George E. Canterbury, who sold Stevens-Duryea cars, while with the J. W. Bowman Co., of Boston has been given the agency for Boston and that territory.

NEW MAIL PARACHUTE TEST IS SUCCESSFUL

WASHINGTON, Dec. 5—The first official post office test of the Jahn parachute mail delivery apparatus was held this morning at the city post office.

A large Glenn-Martin mail plane flew from College Park, Md., to drop the mail sack for the test. At 11 o'clock the big plane swooped down from behind the post office building, and banking around a sharp turn, released the mail pouch with its supporting parachute. The umbrella-like contrivance opened immediately and

slowly descended without any apparent drift.

The packages of eggs addressed to Postmaster Chance and Otto Praeger, chief of the aerial mail service, which were in the bag, were delivered intact to their addresses.

The releasing device which can be used for both parcels and persons, was invented during the war by L. B. Jahn, and its numerous tests so far have proved a success. When used by persons it is strapped on the back like a knapsack.

\$100,000 for Plane Rising Vertically

PARIS, Nov. 15—(Special Correspondence)—Michelin, the French tire manufacturer, has offered a prize of \$100,000 for the first airplane which will fulfill the following conditions: rise vertically from the ground, travel at 124 miles an hour and land vertically within a radius of 16½ ft.

The prize has been offered to the Aero Club of France, which organization will be responsible for drawing up the detail rules covering this competition.

COMMEMORATE MEMBERS

CHICAGO, Dec. 8—Resolutions of regret upon the deaths of members during the year, were passed at the annual meeting of the Tractor and Thresherman's Association in Chicago, Dec. 2 and 3. Members recorded as dead were Frederick Robinson, William Allis, Charles E. Lord, F. R. Pettitt and C. M. Russell.

BRUSSELS SHOW IS ABANDONED FOR YEAR

Ill Feeling Reported Between Makers and Dealers Over Import Question

PARIS, Nov. 15 (Special Correspondence)—No automobile show will be held in Brussels this year. This decision has been taken after long negotiations and considerable discussion between the Belgian manufacturers, local dealers and military authorities. Difficulty was experienced in securing a suitable building, for the Palais du Cinquantenaire, which is the only suitable center, has been taken over by the Belgian army since it was vacated by the German troops, and is not available.

Another building sufficiently large to receive all big manufacturers was discovered, but when close inquiries were made, it was found that instead of 50 exhibitors, the necessary minimum to assure the success of the show, no more than 20 could be secured. Under these circumstances all thought of holding a show was abandoned.

At present there is a certain amount of friction between Belgian automobile manufacturers and dealers. The former, who are not yet in production, desire protection until such time as their factories are in working order.

The dealers, on the other hand, desire the open door in order that they may be able to meet the big demand.

IOWA TRACTOR SHOW PREDICTS BIG BOOM

Farmers Indicate Desire to Increase Production from High-Priced Land

DES MOINES, Dec. 8—Iowa's second annual tractor show held in connection with the annual convention of the Iowa Implement Dealers' Association this week at the coliseum, has shown very conclusively the great increase in interest on the part of the farmer in power farming.

In spite of the coldest first week in December that Des Moines has known in years, the attendance at the show, especially on the part of farmers, has been unusually good, several hundred farmers registering as visitors each day of the convention. The attendance from implement dealers has also been larger than usual.

The show this year was purely a business and educational show, and no attempt was made for elaborate decorations. Each day there were sessions of the implement dealers' association and power farming came in for a major part of the discussion at these meetings. Representatives of the county farm bureaus from practically all counties in the state occupied one day sessions, and it is doubtful if any previous occasion has shown the tremendous interest in the tractor manifested by the several hundred farmers present.

Greatest Increase Coming Soon

Tractor dealers, both implement men and motor car distributors, are of the opinion that the coming season will see a great increase in the tractor business in Iowa. At the present time the state occupies second place in the number of owned tractors, the total for Iowa being 9,628.

There are a total of 148,000 farms in Iowa and the great difference in the two figures above quoted shows the remarkable field which is open to the tractor dealers. The field is particularly fruitful at the present time on account of the skyward jump which the price of Iowa farm land has taken during the past year. For the past few months this rise has not been so marked, but during the early part of the summer it constituted the greatest boom which Iowa farm land has ever known.

With land selling for from \$300 to \$800 an acre the Iowa farmer has become alert to the fact that to make this high priced land pay he must farm more intensively and use his own hands less and machine power more.

Among the tractor manufacturers and dealers showing at Des Moines this week were Griffin-LaCrosse Tractor Co., J. I. Case, John Deere Co., Indiana Silo and Tractor Co., J. I. Case

Co., International Harvester Co., Minneapolis Steel and Machinery Co., Samson Tractor Co., Advance-Rumely Co., Huber Mfg. Co., Hart Parr Co., Emerson Brantingham Co., Iowa Tractor Sales Co., Illinois Tractor Co., Parritt-Denman Co., Allis-Chalmers Mfg. Co., Avery Co., Studebaker Corporation, Iowa Moline Plow Co., and the Cole and Tractor Co.

Equipment Jobbers Form Eastern Ass'n.

NEW YORK, Dec. 8—The Eastern Automotive Equipment Association was organized here recently by jobbers and equipment manufacturers located and represented in the Northeastern section of the United States, including those states between Maine and Washington, D. C., and from the Atlantic seaboard to the Western Pennsylvania line.

The association will operate as an auxiliary of the Automotive Equipment Association, a national body, and in fact had its original suggestion at a preliminary meeting at the time of the recent jobbers convention in Chicago.

The New York meeting was held in the New York Athletic Club, and was attended by forty representatives of jobbers and manufacturers in the territory. At least twenty others who could not attend wrote announcing their intention of immediately becoming members.

The officers elected were:

President, George B. Shearer, president of Gaul, Derr, Shearer Co., Philadelphia.

Vice President, Wallace Page, American Motor Equipment Co., Boston.

Secretary, R. A. Pickard, A. J. Pickard & Co., New York.

Treasurer, Barney Miller, Economy Auto Supply Co., Newark, N. J.

The meeting was opened by an address by Commissioner William M. Webster, of the Automotive Equipment Association, who outlined the benefits that had been brought about by the national organization and pointed out work that the local and territorial organization can do.

It was decided to meet at least three times a year, the next meeting being scheduled for New York, during the national shows, Jan. 3-10. The association is making an appeal to equipment jobbers and manufacturers to become members. Dues were set at \$10 a year, with no initiation fee.

BOOK GEAR ORDERS

PITTSBURGH, Dec. 8—The factory of the recently incorporated Allegheny Gear Works here is rapidly nearing completion and the company is in position to book orders for gears, sprockets, shafts, pulleys, clutches and other tractor parts in quantities. Manufacturing is in charge of E. L. White; sales and service of W. H. Thompson, and metallurgical and laboratory work of H. C. Barnes.

1920 ANNUAL MEETING OF S. A. E. ANNOUNCED

Important Standardization to Be Considered—Fuel Efficiency Session Planned

NEW YORK, Dec. 5—The 1920 annual meeting of the Society of Automotive Engineers will be held in the Engineering Societies Building, 29 West Thirty-ninth street, New York, Jan. 6-8.

The annual session will open with a meeting of the Standards Committee, at which reports of the work accomplished since the semi-annual meeting at Ottawa Beach will be presented by the various standards divisions. The council meeting will follow, at which the reports as adopted by the committee will be considered for presentation to the general meeting of the society.

The first session of the meeting of the society proper will convene at 10 a. m., Wednesday morning. As usual, it will be a business meeting, at which President Manly will make an address and matters of importance will be taken up, including the report of the standards committee. Papers on general subjects will be presented at this session. The Wednesday afternoon session will be a general professional session; papers dealing with aluminum pistons, automotive steam systems, body design and spring suspension being scheduled.

Discuss Fuel Economics

Thursday's session will be known as the Fuel Efficiency Session, at which papers dealing with the ways and means for the more efficient use of fuel will be presented and discussed. The concluding session on Thursday afternoon has been designated as the research session. In addition to the report of the research committee, it is expected that a number of papers concerning research work and the apparatus used in connection therewith will be considered.

On Wednesday evening a carnival will be held at the Hotel Astor. This will be the social occasion for the meeting of the members and their families and guests. The concluding feature will be the annual dinner Thursday evening at the Hotel Astor, at which John Kendrick Bangs will be toastmaster.

FRANK E. BACON DIES

NEW CASTLE, Pa., Dec. 6—Plans for the organization of the Bacon Motors Corp., New Castle, continue, though Frank E. Bacon, who was vice-president of the new company and one of its active organizers was killed in an automobile accident recently. Mr. Bacon before coming to New Castle a year ago, was identified with the Douglas Motors Corp., of Omaha, Neb.

LAFAYETTE DEBUT AT HOTEL COMMODORE

First Showing of New Car During Week of the New York Show

NEW YORK, Dec. 9—American motordom will have its first opportunity to inspect the new LaFayette car during the week of the New York automobile show, Jan. 3-10, when it will be exhibited in the main lobby of the Hotel Commodore, instead of at Grand Central Palace, where the big show is staged.

The apparent exclusiveness of the LaFayette is due to the practice of the National Automobile Chamber of Commerce, which bars the doors of the New York and Chicago shows to cars which have not been in production for at least a year. This edict makes imperative a private showing of the LaFayette, which, six months ago, was only in the blue print stage of development.

The car to be placed on view will be an experimental, hand-built chassis, fitted with a sedan body. No prices will be announced during show week.

Machinery is being installed in the new LaFayette plant in Indianapolis and the stage is rapidly being set for production early next summer. The destinies of the LaFayette company will receive direct guidance from D. McCall White and E. C. Howard, vice-presidents, who are now permanently located at the Indianapolis plant. Charles W. Nash, president of the company, is serving in an advisory capacity, his interests at the Nash Motors Company, Kenosha, Wis., precluding more active participation.

FOREIGN TRADE OPPORTUNITIES

WASHINGTON, Dec. 6—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies of business from individuals and companies in foreign countries. These are listed below. For further information address the Bureau of Foreign and Domestic Commerce and specify the Foreign Trade Opportunity number.

An agency is desired for the near East by a man from that region who will be in the United States for a short time, for the sale of low-priced automobiles. 31384.

Agencies are desired by a firm in Spain for the sale of solid-tire repairing machinery, trucks and upholstering for automobiles. Quotations should be given c. i. f. Spanish port. Payment on delivery of merchandise. Correspondence should be in Spanish or French. References. 31390.

A firm in South Africa desires to get in touch with manufacturers with a view to securing an agency for the sale of motor cars, electrical or gasoline, of a medium and cheap price. 31402.

Agencies are desired by a firm in the Netherlands for the sale of automobiles.

motorcycles, tires and accessories. References. 31412.

A commercial agent from Peru is in the United States and desires to secure agencies for the sale in Bolivia and Peru of automobile accessories and tractors. References. 31425.

An agency is desired by a sales agent in Syria for the sale of motor vehicles, cars and motor trucks. Quotations should be given c. i. f. Syrian port. Payment, cash against documents at port of delivery. References. 31428.

Fiat Plans Sales

Campaign in U. S.

BOSTON, Dec. 6—Announcement has just been made of the formation of the Turin Motors Co. here, which will handle the Fiat line for all New England except Connecticut. It will also have the Maritime Provinces. Lorenzo Avanzino, a prominent Italian importer, is president of the new company, and W. G. Tenney, a former Chandler dealer, is salesmanager. Elmo de Paoli, just released from the Italian army after four years, is to direct the sales of Fiat cars in this country with headquarters at New York. The Fiat Co. plans to build 60,000 cars and will send many here. R. R. Ross, who sold Fiats in New England for several years, will devote all his time to the Columbia, and perhaps another line he is considering.

Old No. 8's Engine

Now Driving a Belt

INDIANAPOLIS, Dec. 6—Old No. 8, winner of the 500-mile international sweepstakes in 1912 at the Indianapolis motor speedway, is back on the job.

After a thrill-less vacation of seven and a half years, the famous blue National that Joe Dawson drove to victory in the most spectacular of the Hoosier classics has been called to rescue in helping overcome the fuel shortage threatening American industry.

In the machine shop of the National plant stands No. 8's engine, driving a belt to an overhead line shaft, and contributing its quota of power to the gasoline propulsive effort of a battery of National engines turning the lathes that are producing parts for the new Sextet.

TO OPEN ENGLISH BRANCH

CLEVELAND, Dec. 10—The Powrlok Co., Cleveland, manufacturers of the Powrlock differential, has completed arrangements for the manufacture and sale of its product in England and the Continent. A factory is to be established in England under the management of E. A. Vandervell and R. A. Rothermel. Both men are prominent in the European motor industry.

Electric Storage Battery Co. has declared quarterly dividends of 2 1/2 per cent on both common and preferred stocks, putting those issues on a 10 per cent a year basis, compared with 8 per cent previously.

DEHAVILAND MAKES RECORD MAIL TRIP

Flies from Washington to New York in One Hour 34 Minutes

WASHINGTON, Dec. 6—All load-carrying airplane records were broken by the twin motor DeHaviland 4-plane devised by and manufactured for the Post Office Department when it covered the distance between the air mail field at Washington and that at Belmont Park, New York—a distance of 218 miles, in 1 hr., 34 min., with a mail load of nearly 30,000 letters, weighing 630 lbs. The speed was at the rate of 138 miles an hour. The best previous record was on September 19, when a single motor DeHaviland carried 300 lbs. of mail from Washington to New York at a speed of 123 miles an hour, and the third best record was on October 1 when a Curtiss plane carried 348 lbs. from New York to Washington at a speed of 118 miles an hour.

The twin-engine DeHaviland today was piloted by Samuel C. Eaton, Jr., of Philadelphia, and left College Park at 11 a. m., arriving at Belmont Park at 12:34 p. m. The time of flight included two circles around the field for altitude before setting out on his course, and was the first trip made by the plane in a regular carrying of mail. This plane is perhaps the only twin-engined plane built in the United States, which not only maintains the altitude under full load with one engine, but actually climbs only one engine.

In the opinion of the postal authorities it is the greatest forward step made in the development of a small weight-carrying plane. It eliminates the fire hazard by having the engines in the wings and away from the gasoline supplies, and also it minimizes danger to the pilot for the same reason. The twin-engine DeHaviland is a distinctive product of the postal service being outlined personally by Second Assistant Postmaster General Praeger. The details of construction were worked out by A. H. Flint, L. W. F. Mfg. Co., College Point, N. Y.

The plane will enable the department to salvage several hundred thousands of dollars worth of DeHaviland 4 war planes and parts, as well as Liberty engines, the power plant being two six-cylinder Liberties of 200 hp. each, which can be constructed almost entirely out of the 12-cylinder, 400 hp. Liberty. The plane can carry nearly double the mail load that is carried by the single motor DeHaviland.

Charles D. Weed, former captain who fought in the Argonne forest and was wounded and gassed in action, has become sales manager of the Allen Waring Co., metropolitan distributor of Maibom cars.

FIAT THREATENS BRITISH MARKET

Four Cylinder Model Reported Under Way Which Will Sell at \$1,625

LONDON, Nov. 20—(Special Correspondence)—After announcing a few days since the ending of his seven years agreement with the Napier interests not to re-enter the British trade, it is reported that S. F. Edge has become a director of the Marles Patent Cam-lock Steering Co., and rumor is busy with his name in other directions. A notable article by him is in the current week's "Automotor Journal," in which he gives some views on the competition and other aspects of the cars at the recent Olympia Show.

Apparently he holds the view that British trade is most threatened by a possible import of F. I. A. T. cars, the design of which is warmly commended by him, and the manufacturing aspect and relative rates of exchange are referred to by him. An Italian engineer, who has had a short experience of American motor car production also, said some months back that the new small F. I. A. T. "four" is probably being built at a factory cost of \$727 which plus freight of \$50 and the import duty of 33 1/3 per cent, about \$250, would enable this car to be brought into the F. I. A. T. depot at a cost, with contingencies, of \$1,125.

With \$500 for profit and British overhead cost a car, this model would be cheaper than almost any of the American cars here, except the Ford. The Chevrolet which comes next, is priced at \$1,750.—Englishman.

GOVERNMENT PLANS TO TEST TRACTORS

WASHINGTON, Dec. 9—Although the Department of Agriculture has not found it advisable at this time to coincide with the suggestion in these columns made several months ago that an experimental farm should be established by the department, where farm and tractor operations and experiments could be developed, the department plans, according to exclusive advice to AUTOMOTIVE INDUSTRIES, to establish the necessary arrangements for testing and rating tractors and investigating engineering problems relating to farm management and farm economic studies, and has recommended an appropriation of \$100,000 to Congress for this purpose.

"In connection with the office of farm management," stated David S. Houston, Secretary of the Department of Agriculture. "I have renewed recommendations submitted at the last session of Congress that approximately \$611,990 be provided for the effective prosecution of an enlarged program for farm management and farm economic studies. If the requisite amount

is made available, the office will be in position to make a comprehensive study of farm problems, in co-operation with the Bureau of Animal Industry and the Division of Rural Engineering, along the lines suggested by the farm power conference which was recently held in Chicago. I have recommended also that the appropriation for the Division of Rural Engineering be increased from \$25,000 to \$100,000 in order that it may make the necessary arrangements for the testing and rating of tractors and investigate certain engineering problems relating to the use of mechanical power on the farm.

"While the department is planning to conduct a series of experiments with a view to determine the relative profitability of the various forms of farm power, and the place of the tractor in agricultural operations, it is expected that the work will be done in co-operation with the agricultural colleges and with actual farmers, and it is not proposed, therefore, to establish a large experimental farm for the purpose."

TRAFFIC EXPERT DIES

NEW YORK, Dec. 4—Through the death of Frank B. Montgomery, traffic manager, the International Harvester Co., has lost one of its ablest officials. In his position he was in charge of all transportation to and from the company's 22 factories in the United States and Canada and was president and general manager of the company's four common carrier railroads. Illinois Northern, Chicago West Pullman & Southern, Deering Southwestern and the Owasco River Railway. He joined the McCormick Co., in 1900 and from the organization of the Harvester Co., in 1902 was its transportation director and authority. He was one of the Chicago group which formed the National Industrial Traffic League in 1907 and was always an active participant in its affairs. In 1912-13 he was president of the Chicago Traffic Club.

Harroun Motors Corp., of Delaware, is seeking to increase its capital stock from \$10,000,000 to \$12,750,000, of which \$2,500,000 is to be 7 per cent cumulative preferred bearing quarterly dividends. The preferred stock is to be redeemable at the company's option of \$115 a share. Twenty-five thousand shares are to be designated as preferred debenture stock, par value \$10, redeemable at the company's option without notice at any time subsequent to the retirement of the \$2,500,000 7 per cent preferred stock at \$10 a share. The remainder of the stock is to be common. Stockholders of the corporation will be asked to authorize this program at the annual meeting, Dec. 27, and will be asked also to authorize the officers to issue \$1,250,000 7 per cent secured notes or bonds payable in five years. A change in the name of the corporation to the Wayne Motors Corp. will also be decided upon.

AIR BRAKE TO BUILD CARS IS THE REPORT

Announcements That Company Plans Entering Automotive Field Premature

NEW YORK, Dec. 10—Following the announcement, a few weeks ago, that the New York Air Brake Co. was developing a truck, comes the fanfare of newspaper publicity today heralding a new passenger car by the same concern.

While the company has not denied its interest in either of these projects, the answer to inquiries regarding them invariably has been, "The announcement is premature."

These announcements thus branded, tell of a passenger car that is to sell in the neighborhood of \$3,500. Production of 10,000 a year is predicted. The car is to be made at the Watertown plant of the New York Air Brake Co., it is said, and the output delivered to another concern at the factory, for marketing.

The new 6-ton "three point" truck, declared to be "now on the market" is described as a vehicle containing a number of important departures from other well-known models, one of the principles of which is said to be a "three-point suspension." Another feature is said to be an "oiling system making oiling necessary only two or three times a year." The substitution of oil for bow springs is also announced. The truck is to be delivered in New York to sell for \$4,850.

Exploit Deppe Superheater

Concerning the passenger car, the Wall Street Journal says: "That New York Air Brake's proposed venture into the manufacture of pleasure cars is merely a means to an end is revealed by the announcement made by the Deppe Motors Corp., which has closed a contract with the New York Air Brake Co., for the manufacture of motor vehicles and the exploitation of the Deppe Superheater.

"New York Air Brake does not plan to manufacture passenger cars on a large scale, as compared with other important companies. The passenger cars it will make will serve principally to demonstrate the value of the Deppe Superheater, right to manufacture which will be sold to any other concern on a royalty basis."

This announcement, as in the case of preceding ones, has been branded as "premature."

ESSEX OUTPUT 20,000

DETROIT, Dec. 6—Essex Motors Co. turned out its 20,000 car Nov. 20, ten days ahead of schedule. The demand is increasing and the production plan for 1920 contemplates 40,000 cars.

PRODUCTION DROPS
IN DETROIT PLANTSScarcity of Steel and Coal
Causes Drop in November Figures

DETROIT, Dec. 6—Production figures in the automobile factories in the Detroit district show a reduction for the month of November, due in a measure to the scarcity of steel and coal and a desire on the part of manufacturers to conserve their stocks as far as possible. Production of Maxwells dropped more than 200, while the output of Chalmers was cut in half. Packard production was reduced almost one-half, while Overland output increased 200. A considerable reduction was shown in the output of Hudson and Essex cars, though production was kept up to the yearly schedule.

Actual figures for the year 1919 with estimates for 1920 will be given out by all manufacturers for publication immediately after the close of the year. Some few production programs for 1920 already have been announced including Overland, 200,000; Hupp, 24,000; Columbia, 15,000; Hudson, 30,000; Essex, 40,000; Saxon, 12,000. Hupp and Paige plans call for an output of 1,800 cars in December to complete the 1919 schedule. Scripps-Booth will try to reach 1,000 and the Overland schedule for the present month is 600 cars a day.

Passenger car production for November with comparative figures for October follow:

Car	Oct.	Nov.
Buick	500	500
Briscoe	60	50
Barley	12	10
Cadillac	110	110
Chalmers	80	44
Chandler	110	120
Chevrolet	1000	1000
Columbia	30	30
Dodge	400	
Dort	100	100
Essex	120	65
Ford	3100	3100
Grant	25	25
Hudson	120	75
Hupp	65	77
King	10	3
Liberty	35	25
Maxwell	375	177
Oakland	225	225
Olympian	10	...
Oldsmobile	150	150
Overland	300	500
Packard	42	24
Paige	35	46
Paterson	10	10
Peerless	25	25
Jordan	18	18
Maibohm	8	10
Reo	175	180
Saxon	20	12
Scripps-Booth	25	14

Studebaker	165	160
Winton	10	15
	7,470	7,155

George Hubbs, assistant sales manager of Dodge Brothers, declined to give out actual production figures, but said the November output was on a pre-war production scale. Their output for the fiscal year ending July 1, 1916, was 61,124, an average of 196 cars a day. Olympian produced no cars in November. The company is in process of reorganization, and will not be in production until after the first of the year.

Lanchester Price

Increased to 7,500

LONDON, Nov. 24 (Special Correspondence)—The biggest jump that has occurred in the prices of British cars has just taken place in regard to the 40 h. p. Lanchester chassis. This new model, which was announced just before the Olympia Show at \$6,200, has, since the show closed, jumped to \$7,500. A statement accompanying this announcement of increase says that, based upon actual cost, the price should be even higher to give a reasonable profit, but it has been fixed at the figure named in order that no suggestion could be made that the makers are merely aiming at being responsible for the highest-priced chassis. This is evidently a reference to the latest price of the Rolls-Royce, which increased on the first day of the show from \$6,500 to \$7,500. The present chassis prices of Lanchester and Rolls-Royce are therefore identical.

Establish Air Line
London to Warsaw

WASHINGTON, Dec. 4—Two large passenger airships of the 0/400 Handley-Page type are being purchased from England by the National Airship Co., of Poland, according to a report from Consul McBride. These ships will soon be completed and will fly from London to Warsaw with thirty passengers.

SPEED TRACTOR PLANT

ANTIGO, WIS., Dec. 8—The Antigo Tractor Co., of Antigo, recently incorporated with \$500,000 capital to build the Four-Wheel-Pull tractor, has concluded arrangements with the Murray-Mylrea Co. to manufacture the machine under contract until its proposed new plant is completed, about May 15 or June 1, 1920. Plans for the new factory are being completed and contracts will be awarded so that excavation may at least be finished this year. The investment in buildings and equipment will be about \$100,000. D. S. Stewart, a pioneer tractor and engine designer of Wisconsin, is chief engineer and production manager.

ACCESSORY BODY
O. K.'s TRACTOR SHOW

Adds Kansas City Club's Annual Event to Sanc-tioned List

NEW YORK, Dec. 9—Arrangements have been made with the Kansas City Tractor Club whereby members of the Motor and Accessory Manufacturers Association are to participate in the fifth annual tractor show to be held in Kansas City, Feb. 16-21 inclusive. This announcement was made by M. L. Heminway, general manager of the accessory association.

Decision to add this show to the list of sanctioned exhibitions was made by the directors of the association in view of the great progress which has been made in the tractor industry in the past few years. Applications and diagrams will be forwarded to members shortly, and indications point to a large representative number of exhibitors.

This is the largest number of shows yet sanctioned by the association for any one year. Applications for space already in for the New York, Chicago and Boston shows are exceeding all previous records, both in number of exhibitors and the amount of space applied for.

Monaco to Resume

Races in Spring

PARIS, Nov. 15—(Special Correspondence)—Monaco, which before the war always held an important motor-boat race meeting in the spring, will revive its demonstration next April.

The program as at present announced covers two distinct events, motor-boat races, from April 1 to April 4, and sea-plane races from April 18 to May 2. The cash prizes for these two events total \$62,000.

These year's events differ considerably from those of pre-war days. The motor-boats must start from Lyons and travel down the river Rhone to Monaco in three stages, respectively: 150, 130 and 106 miles. This takes them down the river Rhone and along the Mediterranean.

There will be a series of races in Monaco bay for distances of 15, 47 and 95 miles. In order to qualify for these races all boats must have shown a speed of not less than 19 miles an hour on the Toulon-Monaco section of the preliminary trip. There will also be special races for 21 ft. boats, and a special race from Lyons to Avignon, down the Rhone for gliders with aerial propellers.

The sea-plane race will be a competition from Monaco to Tunis and return in three stages. On the outward trip each plane must land in Corsica.

HIGHWAY TRANSPORT
CONFERENCE PROGRAMSpeakers and Dates for New
York Show Sessions are
Announced

NEW YORK—The following program has been announced for the transportation conferences to be held here in connection with the National Motor Truck Show, commencing the week of Jan. 3.

MONDAY, JAN. 5, 1920

AFTERNOON SESSION
Merchandising Motor Trucks

"The Trade Segregation Plan"—Robert O. Patten, Truck Sales Mgr., Pierce-Arrow Motor Car Co. Discussion started by David Fenner, International Motor Co.
"Effective Advertising"—L. A. Van Patten, Van Patten, Inc. Discussion started by L. M. Dudley, Federal Motor Truck Co., and John E. Pickens, Selden Truck Corp.
"The Farm Field"—A. R. Kroh, Goodyear Tire & Rubber Co. Discussion started by J. D. Eggleson, International Harvester Co.

EVENING SESSION
Development in Transportation

"Educational Institutions and Highway Transport"—Dr. P. P. Claxton, Commissioner of Bureau of Education, Washington, D. C.
"Ship by Truck"—Ernest Farr, Firestone Tire and Rubber Co.
"Motor Buses and Street Cars"—S. V. B. F. Goodrich Co.

TUESDAY, JAN. 6, 1920

AFTERNOON SESSION
Smoothing the Path of the Motor Truck

"Working for Highway Improvements"—S. M. Williams, Chairman, Federal Highways Council. Discussion started by Pyke Johnson, Secy. of Highways Committee, N. A. C. C., and J. E. Pennypacker, Secy., Asphalt Assn.
"Taking an Interest in Legislation"—Charles T. Terry. Discussion started by Charles S. Bond.
"The Automobile Legislative Council"—Harry Maxwell, Jr., Secy., Legislative Committee, N. A. C. C.

EVENING SESSION
Increasing Motor Haulage Efficiency

"Cost Accounting, Routing and Dispatching"—S. S. Merrithew, Packard Motor Car Co. Discussion started by E. E. Luschum, Gen'l Supt., American Ry. Express Co., and H. W. Drew, Asst. Mgr., Technical Service Dept., Packard Motor Car Co.
"Loading and Unloading Devices"—Jos. Husson, editor Commercial Vehicle. Discussion started by W. P. Kennedy, Consulting Engr.
"Incentives for Drivers and Helpers"—Geo. W. Veale, Timken-Detroit Axle Co. Discussion started by Jos. K. Orr.

WEDNESDAY, JAN. 7, 1920

AFTERNOON SESSION
Selling on the Firing Line

"Proven Sales Plans"—Ray W. Sherman, editor, Motor World. Discussion started by J. W. Allan, Eastern Branch Mgr., Service Motor Truck Co.
"Developing Prospects"—W. H. Moors, Garford Motor Truck Co., Inc. Discussion started by Col. Theo. Baker, Autocar, Boston, and F. J. Porter, Diamond T Motor Truck Co.
"Promoting Rural Motor Express and other Enterprises"—F. W. Fenn. Discussion started by J. D. Eggleson, International Harvester Co.
"Training Salesmen"—Harry J. De Bear, Maxwell Motor Sales Co., N. Y.

EVENING SESSION
Rural Motor Express

"Its Opportunities as an Investment and Business Career"—Tom Snyder, Secy., Highways Transport Div., Indianapolis Chamber of Commerce.
"Its Advantages to the Shipper"—Hon. Peter G. TenEyck, Chrmn., New York State Highways Transport Committee. Discussion started by J. D. Eggleson.
"Its Benefits to the Producer and Consumer"—Professor James E. Boyle, Cornell University. Discussion started by Nat Mallouf.

THURSDAY, JAN. 8, 1920

AFTERNOON SESSION
In the Matter of Service

"The Truck Owners' Viewpoint"—Roderick Stephens, Vice-Pres., Stephens Fuel Co. Discussion started by Nat Mallouf.
"The Truck Dealers' Plan"—Ralph C. Rognon, Vim Motor Truck Co. and Prest. Automotive Serv-

ice Assn. of New York. Discussion started by A. B. Cummer, Autocar, Washington.
Service Mgr., Pierce-Arrow Motor Car Co.
Mgr., Technical Service Dept., Packard Motor Car Co. Discussion started by Walter M. Ladd.

EVENING SESSION
Aids to Motor Truck Efficiency

"Trailers"—F. Van Zandt Lane, Packard Motor Car Co. Discussion started by Harry W. Perry, Secy., Trailer Mfg. Assn.
"Pneumatic and Solid Tires"—B. B. Bachman, Chief Engr., Autocar Co. Discussion started by F. A. Whitten, G. M. C., Pontiac, Mich.
"Designing Buildings, Terminals, Platforms, etc., to Facilitate Motor Transport"—Geo. H. Price.

FRIDAY, JAN. 9, 1920

AFTERNOON SESSION
Selling Motor Transportation

"Handling Motor Trucks and Passenger Cars Together"—Lee J. Eastman, Prest., Packard Motor Car Co. of New York. Discussion started by C. S. Henshaw, Henshaw Motor Co., Boston.
"Offering a Complete Transportation Line"—F. W. A. Vesper, Prest., National Auto. Dealers Assn. Discussion started by Geo. V. Cline, Jr., Troy

EVENING SESSION
Motor Truck and Railroad Freight

"Connecting Farms and Markets"—U. S. Senator Arthur Capper of Kan. Discussion started by A. R. Kroh.
"Cost, Range and Service Comparisons"—W. J. L. Banham, Gen'l Traffic Mgr., Otis Elevator Co. Discussion started by D. M. Pomfret, Traffic Mgr., Colgate Co.; James S. Carling, Traffic Mgr., Arbuckle Bros.; P. M. Ripley, Traffic Mgr., American Sugar Refining Co.

SATURDAY, JAN. 10, 1920

Highway and Motor Transport

"Relation of Roads to Operating Cost"—Arthur H. Blanchard, Professor in Charge of Highway Engineering and Highway Transport, University of Michigan. Discussion started by M. O. Elbridge, Dir. of Roads, A. A. A.

"Progress in Highway Improvements"—H. Eltings Breed, former president, American Road Builders Assn. Discussion started by George C. Diehl and J. E. Pennypacker, Secy., Asphalt Assn.

"Construction Roads for Motor Truck Traffic"—F. G. Thompson, Highway Engr., New Jersey. Discussion started by Robert C. Hargreaves.

Note.—The program will be repeated in Chicago evening Jan. 26, 1920.

PAN PROMOTER
CONVICTED OF FRAUD

CHICAGO, Dec. 8—Samuel C. Pandolfo, who has been in the limelight for the past two or three years as the promoter of the Pan Motor Co., of St. Cloud, Minn., was found guilty here Saturday by jury in the Federal Court of the United States of using the mails to defraud. The twelve other directors of the company were freed from charges of conspiracy. The case has been on trial for nine weeks before Judge Landis, and a verdict was rendered after nineteen hours deliberation.

Pandolfo was found guilty on four counts of an indictment charging the use of the mails to defraud. All of the counts dealt with the mailing of letters to certain prospective stockholders and misrepresentation of the Pan Company's progress and development by stock salesmen. Each count carries a penalty of one year in prison or a fine of \$5,000 or both. All of the defendants were charged with both the misuse of mails and with conspiracy, but the eight St. Cloud business men who have been made directors of the company since this plant was started at St. Cloud, were dismissed from eight of the eleven indictment counts.

ROLL-ROYCE CLOSES
SPRINGFIELD DEALOrganization Rushes to Get
British Car Into Production
—Personnel Announced

NEW YORK—Purchase of the American Wire Wheel Co. plant at Springfield, Mass., for the location of the Rolls-Royce factory in America, was announced here today by John J. McManus, secretary of Rolls-Royce of America, Inc. The plant provides floor space of about 75,000 sq. ft., and when in operation will give employment to approximately 800 hands.

The installation of machinery for the manufacture of the British car at Springfield will begin immediately. While it probably will be several months before actual production will be reached, every effort is being made to hasten the organization of the plant personnel and equipment.

It is planned to use much of the machinery that was operated in the Rolls-Royce airplane engine plant in Cleveland during the war. In addition to this, the company is expected to be in the market for considerable American made machinery within the next few months.

Thomas Nadin, general superintendent of the Springfield plant, who was installed some time ago with offices at 707 City Realty Building, Springfield, Mass., is authority for the statement that it is proposed to make only one type of chassis, and that a replica of the chassis at the present time built at Derby, England. However, negotiations are now pending with the engineers of the British plant for slight changes to adapt the car to use in America. Important among these is the moving of the control units to the left side of the car to facilitate ease in driving under American traffic rules.

The organization of the Rolls-Royce corporation here, which is still incomplete, includes:

President, L. J. Belnap, Montreal, machinery manufacturer and former member of the British War Commission in the United States.

Treasurer, H. C. Beaver, of Springfield, Mass.

Secretary, John J. McManus, of New York, attorney-at-law.

Claude Johnson, Derby, England, Chairman of the Board of Directors and managing director.

Directors: Kenneth K. McKenzie, New York, attorney-at-law, formerly executive chairman of the Rolls-Royce purchasing board in America.

Charles E. F. Clark, Baltimore, Md., president of the Baltimore Light & Heating Co.

Ernest A. Claremont, Derby, England.

J. E. Aldred, New York banker.

Joseph A. Skinner, Springfield, Mass.

ONE TRACTOR TO 40
FARMS IN MISSOURI

Survey Shows Increase of 2,700 Machines Since June 1, 1919

ST. LOUIS, Dec. 8—An unusual census of farm tractors in Missouri has recently been completed by E. A. Logan, field agent of the Federal Crop Reporting Service of the United States Department of Agriculture, with headquarters at Columbia. According to this census, the State has one farm tractor for every forty farms.

The census shows that on June 1, 1919, there was reported on Missouri farms, 3,332 tractors and since that time sixteen companies have delivered to dealers and farmers 2,700 or more machines, or a total at the present time of more than 6,032. One large concern shipped in 1,100 tractors since that time. Logan believes that a perfect resurvey would doubtless locate not less than 7,200 tractors in the State.

"The largest number of tractors, continues the report," are found in the northwest, west, central and east Missouri, with Nodaway, Platte, Callaway and Lincoln Counties, each having more than 100 in operation on June 1. According to dealers, Carter, Douglas, Ozark, Shannon and Taney counties have no tractors used solely for farm purposes. Those makes of tractors reported as having sold over 200 in use on farms at that time were the Avery, Fordson, International, Mogul, Moline and Titan.

"All the state was covered. However, the returns cannot be considered an exhaustive census, but are fairly representative according to kinds of tractors in the various counties. The tractor business is just beginning to get well under way, both dealers and farmers in Missouri now realizing that the tractor has come to stay.

"At the close of this investigation on June 1, 1919, there were 3,332 tractors of sixty different makes reported in farm use in Missouri, as follows:

"Allis-Chalmers, 2; All Work, 4; Aultman-Taylor, 13; Avery, 215; Bates, Steel Mule, 21; Big Four, 8; Big Bull, 51; Case, 123; Caterpillar, 7; Cletrac, 40; Coleman, 9; Dart, 1; Emerson-Brantingham, 46; Fair-Mor (Fairbanks), 3; Farmers' Friend, 1; Fordson, 706; Galloway, 1; Gile, 2; Hart-Parr, 19; Heider, 186; Huber, 2; Indiana, 2; International, 237; Keck-Gonnerman, 9; LaCrosse Happy Farmer, 41; Lauson, 9; Leader, 4; Liberty, 1; Massillon, 1; Minneapolis, 3; Mogul, 260; Moline Universal, 267; National, 1; Oil-Gas (N. & S.), 3; P. & O., 2; Parrett, 26; Parry, 1; Pioneer, 2; Plow Boy, 2; Plowman, 7; Peoria, 7; Prai-

rie Dog, 1; Reeves, 2; Republic, 2; Rumley Oil Pull, 73; Russell, 16; Samson, 14; Sandusky, 3; Square Turn, 3; Staude, 3; Stevens, 1; Stotesbury, 1; Titan, 414; Torpedo, 1; Turner Simplicity, 6; Twin City, 2; Wallis Cub, 85; Waterloo Boy, 116; Webber, 1; Yankee, 1. Make unreported, 229."

British Strikers

Want Gov't Inquiry

LONDON, Nov. 18—(Special Correspondence)—Light is thrown on the mystery of the iron moulder's strike which is shaping to close down the motor industry, unless relieved by imports from the United States and France and Belgium, by a statement of the organizer of the Ironfounders Society recently at a meeting of the men in Coventry, which is the Detroit of the British motor trade.

This official urged the Government to set up a committee to enquire into the following points: (1) What was the production of castings of all descriptions in the United Kingdom before the war? (2) What was the production today? (3) What was the price employers received for castings during the war? (4) What is the present price? (5) What are the profits?

A Birmingham firm of employers has made a categorical reply to the points thus raised. The firm gives figures showing that while materials have gone up approximately one-third, wages have advanced more than double, output has dropped about one-third, selling prices have nothing like doubled, and the gross profits per cwt. have been reduced over 25 per cent.

Given for argument a works employing 120 men, the firm points out that the \$3 per week advance now demanded would have meant for the best twelve months an increased wages bill of \$23,400 or \$3,970 more than the total gross profits.

Meanwhile the deadlock continues, and today it is announced that the Scottish moulders have decided to ballot to strike also. So far as motor production is concerned the car-side is not as likely to be as harassed for castings as the truck makers whose output continues steady throughout the year, whereas car production hangs back until the early weeks of the new year.—Englishman.

ORGANIZE IN JAPAN

WASHINGTON, Dec. 4—The organization of an American Chamber of Commerce is being planned by representatives of 35 American firms in Kobe, Japan, according to a recent Commerce Report. The growth of American industry in Kobe is demonstrated by the fact that there were but 15 American and semi-American firms there at the outbreak of the war, as compared with 42 such firms now located there.

Brooklyn Combines Car and Truck

Brooklyn Combines

Automobile Shows

NEW YORK, Dec. 6—Announcement is made by the Brooklyn Motor Vehicle Dealers' Association that the Ninth Annual Brooklyn Automobile Show will be held in the 23rd Regiment Armory, during the week of February 14 to 21. This announcement followed a meeting of the association held at the Long Island Automobile Club at which Clifford M. Bishop was elected president of the association. The other officers elected are Chester J. Maxson, vice-president; Fred Kengetter, second vice-president, I. C. Kirkham, treasurer and W. A. Sellon, secretary.

For the first time in the history of the Brooklyn automobile show, both passenger cars and motor trucks will be exhibited on the floor of the armory during the same week. The passenger cars will be arranged in the center of the armory, while motor trucks will occupy the spaces on the sides of the interior. This combined exhibition of passenger cars and motor trucks is made possible by the exhibitors cutting down the size of their spaces.

Important British

Firms Consolidate

LONDON, Nov. 17 (Special Correspondence)—Amalgamation of business interests controlling the motor industry in England continues. The latest instance is the acquisition by John Lysaght Ltd., Newport Monmouth, of a controlling interest in Joseph Sankey & Sons, Ltd., operating the Manor Ironworks, Wolverhampton; Albert Street and Bankfield Works, Bilston, and the Hadley Castle Works, Wellington. The amount involved in the deal is between \$2,000,000 and \$2,500,000.

Sankey & Sons' chief activities are the rolling of special qualities of steel sheets, stamping for the electrical and engineering trade, the manufacture of hardware and enamel ware, motor equipment and special steel wheels. The close association of Lysaghts and Sankeys is fraught with substantial advantage to both. On the one hand Lysaghts adds important specialized lines to its present manifold operations, while securing a fast customer for its own products. On the other hand Sankey's is assured of all the steel it needs and just the right quality for its distinctive manufactures.

COAST-TO-COAST AIR BILL

WASHINGTON, Dec. 9—Air mail service between New York and the Pacific Coast by way of Chicago would be authorized by a bill introduced by Congressman Randall of California and referred to the committee on post offices and post roads.

Head of Saxon Co.

Tenders Resignation

DETROIT, Dec. 9—Benjamin Gotfredson, president of the Saxon Motor Car Co., tendered his resignation and will devote all of his time to the interests of the American Auto Trimming Co., of which he also is president.

News of the resignation of President Gotfredson caused much surprised comment in automobile circles for his successful operation of the company as the representative of the creditors and stockholders had made him loom as a factor in the industry. It was announced at the plant today that Gotfredson's decision to tender his resignation was reached despite strong opposition of the Creditors' Committee and the directors of the company.

Gotfredson was called to the presidency when the life of the company was threatened as the result of a series of misfortunes a few years ago. In the two years in which he has been at the head of the company he has brought it to a point where it now is safely on its way. Gotfredson began an energetic campaign for reorganization immediately upon being inducted into office, despite the generally pessimistic view of the trade. The company not only gained strength as a going concern but about 60 per cent of its indebtedness was liquidated and there now is in hand sufficient to protect all of the company's obligations, and provide incentive for the reorganization now under way.

The constantly increasing business of Gotfredson's other company with plants in Detroit, Cleveland and Canada, he says, compelled him to devote all of his energy in that direction.

C. J. Welch has been promoted to general salesmanager of the Oneida Motor Truck Co., Green Bay, Wis. H. E. Johnston, of the Oneida Co., has been appointed manager of the export department.

Owen Moynihan has resigned as general salesmanager of the Amazon Rubber Co., Akron, to become manager of the Malay Rubber Co., now being organized.

Arthur A. Roelofs has been appointed special representative through the middle west territory for the Precision and Thread Grinder Manufacturing Co., Philadelphia.

R. A. Doty has accepted the position of retail salesmanager of the Overland Hansom Co., Waterloo, Ind., and will assume charge of the sale of Willys-Knight and Overland cars in that vicinity. He succeeds V. L. Brown, resigned.

E. F. Norelius has resigned his position with the Holt Manufacturing Co. of Peoria, Ill., and has opened consulting and designing engineering offices at 430-431 Andrus Building, Minneapolis. Norelius was connected with the Holt company for ten years in different engineering capacities, and during the war was identified with the design and development of artillery tractors.

Men of the Industry

Changes in Personnel and Position

Robert A. Weinhardt has been appointed chief engineer in charge of the engineering and inspection departments of the Supreme Motors Corp., of Warren, O. Weinhardt was formerly assistant chief engineer with the Continental Motors Co.

L. D. Speed who has been representing the Northwestern Chemical Co., of Marietta, Ohio, in the central western states, has been promoted to central sales supervisor, and will now have charge of the entire central territory.

Ralph N. Soule has been appointed manager of the service department of the Dort Motor Car Co., of Flint, Mich. Soule has had a long and successful engineering experience.

R. P. Henderson has been elected vice-president and director of sales of the Martin-Parry Corp., builders of commercial automobile bodies at Indianapolis. Henderson was general salesmanager of the Parry Manufacturing Co., at Indianapolis for three years.

R. H. Townsend has assumed his position as chief engineer of the Hooven Radiator Co., Chicago. He was for six years general construction superintendent for the L-L Nunn interests.

Frank S. Cooke, advertising manager of the Denby Motor Truck Co., has resigned to become associated with the Green, Fulton, Cunningham Advertising Co. J. C. Ayers, former vice-president of the Denby Motor Truck Co., who resigned some time ago is devoting his time to the business of the Towar-Ayers Co., distributors of the Denby truck. Towar-Ayers will place three branches in Michigan and one in Ohio.

Austin Parker, of New York, has joined the Packard organization as director of publicity. He was in the war zone for the New York Tribune and later served in the Lafayette and American Flying Corps.

James Joyce, Jr., vice-president and general manager of the Dreadnaught Tire & Rubber Co., has tendered his resignation.

W. H. Vesey, formerly of Detroit, will have charge of a branch office in Cleveland of the Bossert Corp., Utica, N. Y., manufacturers of automobile stamping and pressed steel parts. The Detroit office will be in charge of R. J. Miner, formerly assistant chief engineer.

C. W. Sackett has been appointed distributor for the Kant-Break Spark Plug Co., with offices in Detroit.

Ford Agent in

England Resigns

LONDON, Nov. 25—(Special Correspondence)—When Sir P. D. Perry returned to England last autumn he had resigned connection with the Ford interests at Manchester, but it was understood he retained his connection with the Fordson tractor interests at Cork, a subsidiary business styled Henry Ford & Son, Ltd. He had been elected a member of the Cork Harbour Board. Last week a letter of resignation of this honor was received from him on the ground of his having severed his connection with the local Ford company.

The latest rumor is that Sir Percival is behind a scheme to produce a British-Ford, about which some information is to be given at a trade and press luncheon at Richmond, Surrey.

Earl E. Beveridge has been appointed works manager for the Federal Corp., Westfield, Mass., manufacturers of Liberty and Jumbo sparkplugs, and Syco products. Beveridge was formerly connected with the Westinghouse Electric & Manufacturing Co., Pittsburgh.

Flavius G. W. Sudrow, zone salesmanager of the Chevrolet Motor Co., of Kansas City and treasurer of the St. Louis Body Co., has resigned to become distributor for the Gardner Motor Co., in Kansas City and the Southwest.

E. B. Barber, formerly with the Blodgett Engineering and Tool Co., has joined the manufacturing forces of the LaFayette Motors Co., at Indianapolis. Barber was chief tool engineer for the Blodgett Co., and is widely known in engineering circles.

U. S. Rubber Gives

Course to Foremen

NEW YORK, Dec. 6—The tire division of the United States Rubber Co. has inaugurated at its Hartford, Conn., Detroit and Indianapolis plants, a plan of training foremen and other members of the supervisory force. Classes at these plants totaling 825 men have been formed to pursue a course in modern production methods. This comprises the study of specially prepared text material, the solution of practical factory problems, and the discussion of this material at six meetings held in the plant after hours, at three-week intervals.

The subjects covered in the training are:

How to promote teamwork in the shop.

Handling workers by methods that make for harmony and efficiency.

Improved methods of factory organization.

Handling materials and equipment productively.

Reducing costs and stopping leaks.

Modern methods of management.

The course is conducted under the direction of the Business Training Corp., of New York, who supply text material and instruction service.

French Makers Buy

\$30,000,000 Plant

PARIS, Nov. 15—(Special Correspondence)—A French syndicate, comprising many of the leading automobile manufacturers of France, has bought for \$30,000,000 the Thyssen blast furnaces, steel works, mines, and case hardening plant at Hagondage in Lorraine.

This plant was a German property and was seized by the French authorities when Lorraine was annexed. It was sold by the Metz courts. The French syndicate is presided by Baron Petiet, who is the president of the Ariès Co., and also president of the French Society of Automobile Manufacturers.

The leading automobile firms forming part of this syndicate are: Renault, Panhard-Levassor, Ariès, Peugeot, Weyher & Richemond, de Dion-Bouton, Gnome & Rhone, Bessonneau, S. E. V., Lorraine-Dietrich, Blum-Latil, Lemoine, Michelin, Berliet, Malicet & Blin, and Hispano-Suiza.

The acquisition of these one-time German works will give the French automobile industry a considerable advantage in obtaining raw material.

AMERICAN GEAR TO BUILD

Permit for the erection of a building to cost \$180,000 was granted the American Gear & Manufacturing Co., of Jackson, Mich. The addition will be 169 by 280 feet and will be two stories high, permitting wide expansion of their production program.

NEW BUILDING PLANT

BOUND BROOK, N. J., Dec. 10—The Bound Brook Oil-less Bearing Co., manufacturers of Bound Brook and Nigrim Oil-less bushings, has added another building to its plant, giving it 18,000 sq. ft. of additional space for manufacturing.

NORMA IN NEW PLANT

NEW YORK, Dec. 10—Factories of the Norma Co., of America, manufacturers of Norma precision bearings, have been moved from the Bronx to Long Island City, where a modern four story building has been acquired. Executive offices of the company at 1790 Broadway, New York, have been consolidated with the factory at the new address.

MOVES GENERAL OFFICE

NEW YORK, Dec. 10—General offices of the Polack Tyre & Rubber Co., have been removed from Broadway and Sixty-second street, New York, to the factory at Bridgeport, Conn. The New York sales office will be continued.

RE-INCORPORATE WHEEL CO.

SOUTH BEND, Ind., Dec. 8—The Johnson Motor Wheel Co., of South Bend, has been re-incorporated and plans looking to the acquisition of the George Cutter Co., which has been making the Johnson wheel during the past year are in progress.

Current News
of FactoriesNotes of New Plants—Old
Ones Enlarged

NEW PLANT SOON READY

SPRINGFIELD, Mass., Dec. 8—Smith-Springfield Body Corp., factories which are being built on a five acre tract in this city will be completed about Jan. 1. A year's option on an adjoining five acre tract has been taken. Equipment for the manufacture of automobile bodies will be installed as soon as building progress permits.

LIBERTY PLANT READY

DETROIT, Dec. 8—Liberty Motor Car Co.'s new administration building will be completed by Jan. 1 and completion of the factory additions will follow rapidly. The new assembly plant is completed and in use together with the old building in the effort to speed up production to meet the increasing demand for cars.

LUBRICATING CO. GROWS

MADISON, Wis., Dec. 8—The Madison Kipp Co., Madison, manufacturer of automatic lubricating devices for passenger cars, trucks, tractors, machine tools, etc., will expend between \$200,000 and \$250,000 for factory extension during the winter. Plans have been completed and contracts awarded for a five-story fireproof plant addition, 52x240 ft., and upon the completion of this unit, other extensions will be undertaken.

GEARSHIFT OUTPUT SOLD

EAU CLAIRE, Wis., Dec. 8—The Laursen Gearshift Co., Eau Claire, has taken an order for 10,000 units for immediate delivery, which with other large orders will keep the present facilities fully occupied for five or six months. Enlargement of the works will be undertaken at once.

WILL EXPORT TRACTORS

KALAMAZOO, Mich., Dec. 8—Reed Foundry and Machine Co., Kalamazoo, has received an export order for tractors amounting to \$500,000 and production on the order will start Jan. 1. Charles T. Howe, 299 Broadway, New York, is the purchaser. The company also is in receipt of a large order from Ohio distributors.

START DEFIANCE ADDITIONS

DEFIANCE, O., Dec. 8—Additions to the Defiance Machine Works, to permit of the employment of 500 more men and the Defiance Tire & Rubber Co., factory, involving an aggregate expenditure of \$750,000, will be started this week. The tire factory building will be 50x175 ft. and three stories high.

TOP CO. PLANS ADDITIONS

FOND DU LAC, Wis., Dec. 8—The Longdin-Brugger Co., Fond du Lac, has increased its capital stock from \$40,000 to \$120,000 and will erect factory additions which will increase its output of passenger car tops and truck cabs about 300 per cent by May 1, 1920. Additional acreage at West Second and Macy streets has been acquired for the extensions, which will measure 120x240 ft. The concern is specializing in the production of the "Close-Tite" winter top for open cars and has reached an output of 50 a day, which will be increased to at least 200 by midsummer.

ATLAS FORGE COMPANY GROWS

LANSING, Mich., Dec. 8—Atlas Drop Forge Co., of Lansing, has let contracts for new hammer equipment, increased furnace capacity, steel storage and boiler power to care for heavy demands of the automobile and truck manufacturers. A 300 horsepower boiler, 150 feet of steel storage and a new traveling crane are included in the improvement program.

CASSIDY CO. CHANGES

NEW YORK, Dec. 5—Announcement is made by the Edward A. Cassidy Co., of New York, that after Jan. 1, 1920, it will discontinue to act as the sales department for the Rajah Auto Supply Co. The Cassidy company has become sales department for the Sterling Varnish Co., Pittsburgh, manufacturers of insulation material.

MICHELIN OPENS BRANCH

MILLTOWN, N. J., Dec. 4—The Michelin Tire Co., Milltown, has opened a factory branch at 26 West Woodbridge street, Detroit, under the supervision of R. B. Tracy, district manager. This branch will handle the Eastern Michigan and the northwestern Ohio territory, and will be open for business about Dec. 15.

ADD TO VULCAN OUTPUT

PHILADELPHIA, Dec. 5—A contract has been awarded for an addition, containing 30,000 sq. ft. of floor space, to the Vulcan Rubber Co.'s plant on West Lake Road, Erie, Pa. The addition, which will be devoted to the manufacture of cord tires, will be two stories high, of steel, brick and concrete. The machinery and equipment for the plant has been ordered.

OPEN EQUIPMENT DEPT.

NEW ORLEANS, Dec. 4—Stauffer, Eshleman & Co. Ltd., New Orleans, are establishing a department to handle a complete line of automobile equipment.

SAYERS PLANT GROWS

CINCINNATI, Dec. 8—Plans for the erection of a new automobile plant for the Sayers & Scoville Co., here have been completed. It is expected the first unit of the plant will be completed early in the spring and will afford 100,000 sq. ft. of additional floor space for the manufacture of the Sayers Six.

Calendar

SHOWS

January—New York. International Automobile Mfrs.' Congress.

Jan. 3-10—New York, N. Y. Grand Central Palace, National Automobile Chamber of Commerce. S. A. Miles, Manager.

Jan. 3-10—New York City. Eighth Coast Artillery Armory, commercial cars and accessories.

Jan. 8—Chicago. Airplanes. Manufacturers' Aircraft Association. Congress Hotel.

Jan. 17-21—Cleveland. Nineteenth Annual Automobile Show. Cleveland Automobile Mfrs.' and Dealers' Assn. Wigmore Coliseum.

Jan. 17-24—Hartford, Conn. Shows, State Armory. Annual Exhibition. Arthur Fifoot, Manager.

Jan. 19-25—Milwaukee, Wis. Auditorium. Annual Motor Exhibition. Milwaukee Automobile Dealers' Inc.

Jan. 24-31—Chicago, Ill. Coliseum. Cars: Drexel Pavilion, National Automobile Chamber of Commerce, S. A. Miles, Manager.

Jan. 24-31—Chicago. International Amphitheater, Commercial cars and accessories.

Jan. 31-Feb. 6—Kansas City, Mo. Annual exhibition, Overland Bldg. E. E. Peake, Manager.

Jan. 31-Feb. 6—Minneapolis, Minn. Annual automobile and tractor show, Overland Building.

Feb. 2-7—Toledo, Ohio. Annual Automobile Show, Terminal Auditorium.

Feb. 9-14—Nashville, Tenn. Nashville Automobile Trade Association.

Feb. 22-28—Ottawa, Ont. Motor Show.

Feb. 21-28—Louisville, Ky. Twelfth annual exhibition, Louisville Automobile Dealers' Assn., First Regiment Armory.

February—Chicago. International Automobile Mfrs.' Congress.

February—Deadwood, S. D. Annual Show, Deadwood Business Club, F. R. Baldwin, Manager.

March 1-7—Springfield, Mass. Annual Automobile Show, Springfield Automotive Dealers' Assn. Harry Stacy, Secretary.

March 12-20—Boston, Mass. Annual Automobile Show, Mechanics' Building.

FOREIGN SHOWS

January—Glasgow, Scotland. Scottish Motor Exhibition.

February—Manchester, England. North of England Motor Exhibition.

Feb. 22-March 6—Birmingham, Eng. British Industries Fair.

March—London, Eng. Motor Boat Marine and Stationary Engine Exhibition.

March—Adelaide, Australia. All Australian Exhibition of motor vehicles, airplanes, engines and automotive equipment.

March 1-15—Lyons, France. Automotive Products, Lyons Industrial Fair.

April or May—London, Eng. Commercial Vehicle Exhibition, Olympia.

April 3-May 4—Buenos Aires. Exposition of U. S. manufacturers.

TRACTOR SHOWS

Feb. 2-14—Wichita, Kan. Tractor and Farm Machinery Forum. Wichita Thresher-Tractor Club.

Feb. 16-21—Kansas City, Mo. Fifth Annual Kansas City Tractor Club. Guy H. Hall, Manufacturer.

CONTESTS

August, 1920—Paris, France. Grand Prix Race, Sporting Commission, Automobile Club of France.

June, 1920—Omaha, Neb. Reliability Truck Tour.

CONVENTIONS

Dec. 3-5—Cleveland, Ohio. Automobile Trade Assn. Annual Convention, American Conference.

Feb. 9-13—Louisville, Ky. Seventeenth Annual Convention American Road Builders' Assn., Tenth American Good Roads Congress, and Eleventh National Good Roads Show.

May 15-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

S. A. E. MEETINGS

Jan. 6-8—New York. Annual Meeting.

Jan. 13—Chicago. Aeronautic Meeting, auspices Mid-West Section.

Jan. 28—Chicago. Truck and Tractor Meeting, Hotel La Salle.

Feb. 12—Kansas City, Mo. Tractor Dinner, Hotel Baltimore.

Kansas City Show in Larger Building

KANSAS CITY, Mo., Dec. 5—The annual automobile show of the Kansas City Motor Car Dealers' Association, will be held Jan. 31 to Feb. 6, occupying three floors of the Overland Building, with a total exhibition space of 180,000 sq. ft. The largest space formerly used was 100,000 sq. ft. The first floor will be all trucks, the third all passenger cars and the second partly passenger cars and partly trucks. Special space for exhibition of equipment has been assigned on the second floor.

Louisiana Highway Enthusiasts to Meet

ALEXANDRIA, La., Dec. 8—Good roads workers and enthusiasts of Louisiana are preparing to attend the second annual convention of the Louisiana-Jefferson Highway Association, which meets in Alexandria Dec. 18. Each of the eighteen parish clubs of the association will be represented by at least five official delegates.

The convention will name directors of the international board, elect state officers and hear reports from all parish clubs in Louisiana as to the progress of good roads in the parishes. It will be the

largest highway convention ever held in Louisiana and one of the most important ever held in the South.

Governor Pleasant, Mayor Behrman, of New Orleans; Mayor Ford, of Shreveport, and Duncan Buie, state highway engineer, have promised to attend the convention. Walter Parker, vice-president of the international association, will deliver an address.

Tax on Gasoline Proposed in Ohio

COLUMBUS, O., Dec. 8—With the convening of the Ohio General Assembly after a lengthy recess, legislation looking towards the taxing of automobiles on the basis of horsepower has been initiated. The first bill provides for a license fee based on horse power as follows: \$8 per year for gasoline cars up to 25 hp., \$12 per year for gasoline cars under 35 hp., and \$20 for all cars over 35 hp. On trucks it is proposed to add an additional 2 cents a hundred pounds over a certain limit on weight. Horsepower is to be figured by size and stroke of cylinders.

A counter proposition to issue licenses free and place a tax on gasoline has been introduced and is finding supporters. Most of the automobile clubs in the state through the Ohio Automobile Association will oppose the graduated license tax.

Exhibitors Take Montreal Spaces

MONTREAL, Dec. 5—First official lists of the Montreal Motor Show for 1920, which will be held in garage buildings of the Montee du Zouave, from Jan. 17 to 24, announce that 115 spaces have been taken by 69 dealers, the list comprising exhibitions of all leading American and Canadian automotive products.

Cars, trucks, tractors and equipment will be shown side by side, no special grouping of classes being made. More exhibitors are registering from day to day and a complete list of all which will be prepared in a week or more is expected to show the most powerful array of manufacturers and representatives ever assembled in a Montreal show.

Battery Company Will Make Accumulator

MILWAUKEE, Wis., Dec. 8—The Duplex Storage Battery Co., of Milwaukee, organized a short time ago with \$50,000 capital, will establish a plant about Jan. 1 for the manufacture of an electric accumulator designed by William Petschel, an electrical and chemical engineer of international reputation. Petschel has been elected president and general manager, and George S. Eastman, secretary and treasurer.